85th YEAR

AMERICAN GAS JOURNAL

MARCH 1944

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Trained men not needed to install this bottle-tight mechanical joint.

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The number-one job of the gas industry—and of the cast iron pipe industry—is to help win the war. The gas industry has made a magnificent contribution, in spite of the handicaps of deferred maintenance and extensions to distribution systems. The cast iron pipe industry is making large quantities of munitions and war material that, three years ago, few would believe could be produced in a pipe foundry.

☆ ☆ ☆

Gas is indispensable to many war industries. Furthermore, there is an ample supply of foundry pig iron. *Consequently, the Office of War Utilities of the War Production Board encourages the maintenance of gas distribution systems at full efficiency.

☆ ☆ ☆

The installation of mechanical joint cast iron pipe does not require skilled labor. It can be quickly and easily installed by untrained men. The manpower situation is easing. And also important—cast iron pipe is available now for immediate shipment.

For further information, write Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, Peoples Gas Building, Chicago 3.

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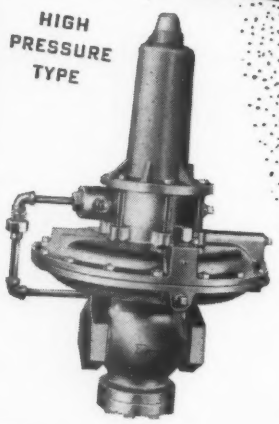

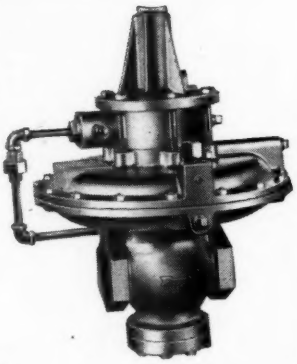

STANDARD TYPE

WRITE FOR
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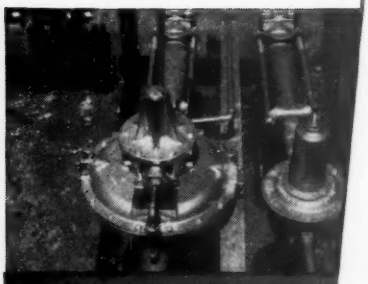

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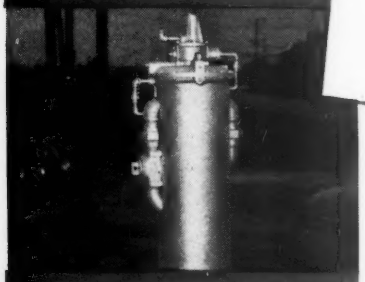
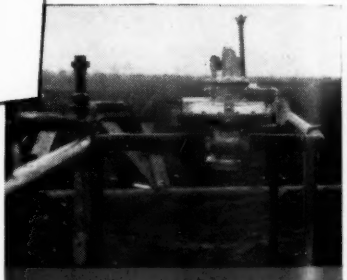
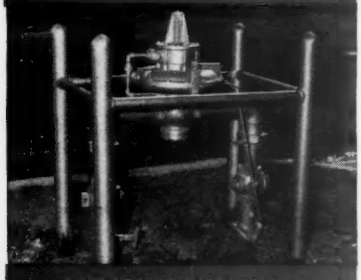


DISTRICT PRESSURE CONTROL FROM AN ELEVATED HEADER AT STREET CORNER



AN ARKANSAS CEMENT PLANT IS SERVED WITH GAS THROUGH THIS INSTALLATION



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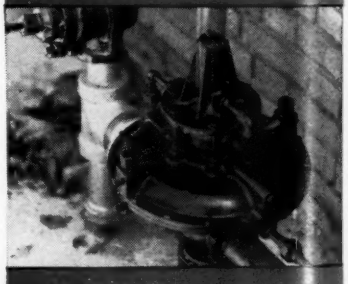

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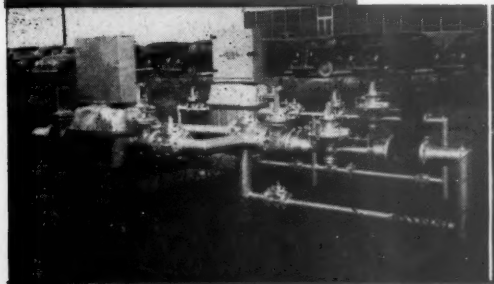
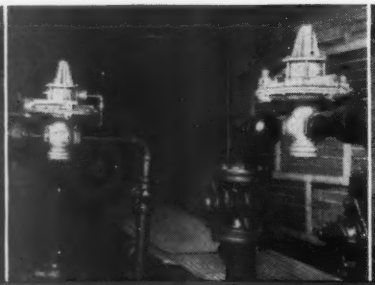
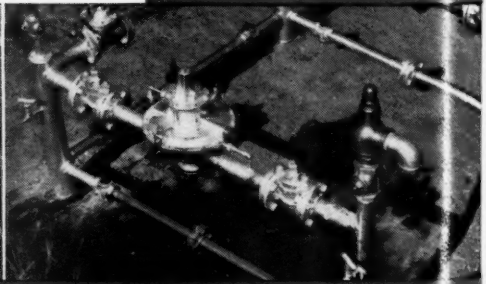


COMBINATION INSTALLATION SERVING AIRCRAFT PLANT THROUGH EMCO REGULATORS AND METERS



BRICK KILNS ARE HERE BEING SERVED WITH GAS AT CONSTANT UTILIZATION PRESSURE



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A. Yes, indeed, if it is a Semet-Solvay REVERSE FLOW Water Gas Machine.

Q. *Does operation on 100% bituminous and 100% heavy oil cause the machine to smoke?*

A. No, indeed, not the Semet-Solvay REVERSE FLOW Water Gas Machine.

Q. *Can a carbureted water gas machine be changed at will, and without alterations in the machine, from coke or anthracite to bituminous coal, and from one grade of oil to another grade?*

A. Yes, indeed, if it is a Semet-Solvay REVERSE FLOW Water Gas Machine. You can take advantage of every change in market prices.

Q. *Is the REVERSE FLOW process new and untried?*

A. No, indeed. The first Semet-Solvay REVERSE FLOW Water Gas Machine was installed in 1937. Today there are ten plants in successful operation and three more under construction. Names gladly furnished on request.

Q. *Can existing water gas machines be modernized to obtain REVERSE FLOW advantages?*

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Q. *Are all Semet-Solvay Water Gas Machines REVERSE FLOW?*

A. No, indeed. Semet-Solvay can furnish all types of water gas machines.

Q. *Are all REVERSE FLOW Water Gas Machines Semet-Solvay Machines?*

A. Yes, indeed. REVERSE FLOW is an exclusive Semet-Solvay development.

Q. *Is it difficult to make sure just what economies and other advantages you can expect from the REVERSE FLOW process in YOUR plant?*

A. No, indeed. Semet-Solvay will be glad to make a survey and complete report without cost or obligation to you. Why not write them today?

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ENGINEERING CORPORATION

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NO. 1 TAX SAVER

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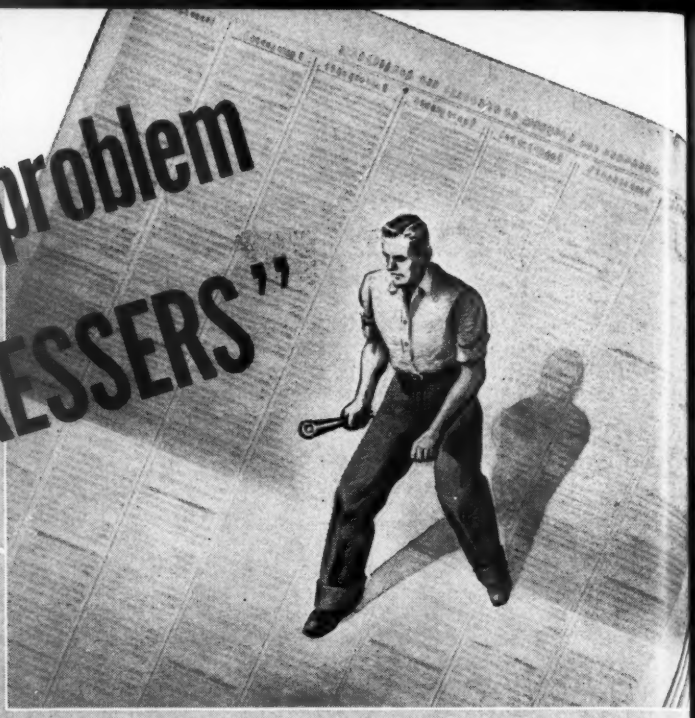

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Couplings, Fittings, Repair Clamps and Sleeves
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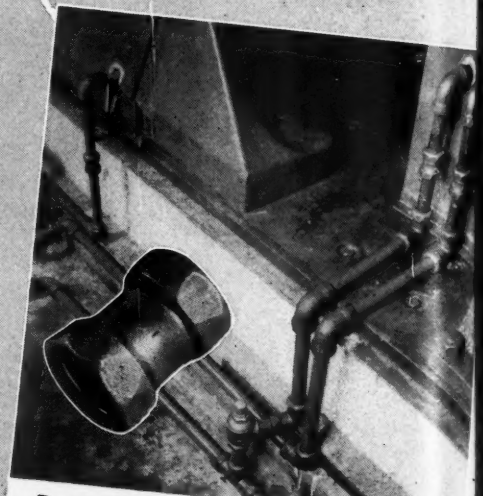

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BRADFORD, PENNSYLVANIA

VOLUME 160
NUMBER 3

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Those Projects for the Future!

2083

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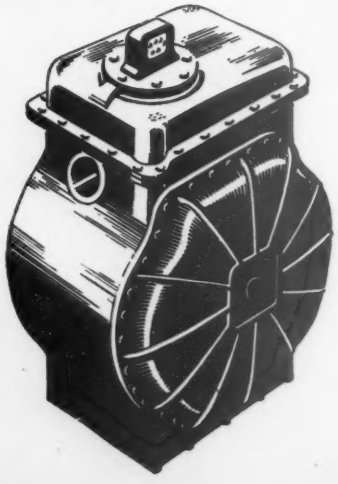
Meanwhile, our research engineering continues to welcome the stimulating suggestions which our customers have always so helpfully offered in the past.



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MARCH
1944

AMERICAN
GAS JOURNAL

VOLUME 160
NO. 3

Selling Fuel the Chief Post-War Problem of the Gas Industry

WITH THE END of the war in Europe reasonably in sight, the nation is giving serious thought to the intricate problems that peace may bring, and properly so, for it is only through intelligent and foresighted action that it will be possible to avoid unfortunate repercussions, and proceed in an orderly manner to convert industry to the normal production of consumer goods.

The paramount problem, of course, will be the reemployment of the millions of workers now engaged in the war effort, and finding remunerative positions in the national economy for the other millions now in the armed forces. The country is determined that there shall be no more bread lines or apple sellers, and these can be avoided only through tremendously increased production of consumer goods, both for sale in domestic markets and in the channels of foreign trade.

There is a tendency at present to glamorize the post-war, to paint glowing pictures of new and revolutionary automobiles, radios, refrigerators, appliances, and other modern conveniences, but it is probable that there will be few immediate changes, but rather a slow transition that may take years in achievement.

Reversion to the orderly processes of peace will not be an easy matter, especially where it will mean total reconversion, such as in the case of appliance manufacturers, who have been engaged fully in the production of war equipment.

However, no such intricate problems will confront the gas utility, the war activities of which have been essentially those of normal times. The great problems here will be to find profitable markets for the increased load that has been created by the demands of war and to meet the acute competition from other fuels that peace inevitably will bring. Militant leadership, vision, and aggressive salesmanship will be necessary if gas is to hold its own in the coming fight with competitive fuels. There is only one chief problem to solve. It is how the gas industry can retain its present domestic and industrial loads, and develop new, profitable markets.

The writer of this article is not connected with any gas company, but has had a wide contact with them. He states what in his judgment should be the logical planning program of gas companies for the post-war period.—Ed.

Only through increased sales will the industry be able to meet the coming era of acute competition. How to overcome this competition, of course, will be the problem of the individual gas company, strengthened by a national campaign to give the public the true facts about their fuel, the best and most economical source of direct heat on earth. Everything must be done to safeguard the domestic business, which is the foundation stone of its prosperity. But that alone will not suffice. No potential outlet should be ignored.

Utility-Dealer Co-operation

Of all the avenues that seem to offer bright promise for gas promotion, the greatest of all in potentialities seems to be utility-dealer cooperation, which has been utilized in a broad way by relatively few companies. Even a perfunctory examination of a given situation in any section of the country leads always to the conclusion that there is an imperative need for better reciprocal relations between the gas company and the master plumbers, heating contractors, and other retail appliance dealers. Those companies that have fostered such good relations have been repaid a hundredfold in added sales. Notable among such utilities are The People's Gas, Light & Coke Company and the Brooklyn Union Gas Company. It is true that in many cases the dealer is not a good merchandizer, but with patience he can be made one.

The question of utility-dealer cooperation is a complex one, and varies with the locality. Where dealers are inefficient or indifferent, the problem is accentuated. That is why the gas company should do everything within its power to court and encourage their dealers. They can do so in multitudinous ways, such, for example, as holding regular monthly meetings for the discussion of mutual problems, periodical social entertainments, etc. The company also should extend technical assistance to the dealer, and cooperate with him in other ways, such as promoting periodical appliance exhibits.

Mutual Understanding

A very necessary step in the development of utility-dealer relationship would seem to be the establishment of a definite code that each party would live up to in spirit as well as in letter. The utility should keep in closer contact with the plumbers, heating contractors, and other retailers, and try to work out with them a policy of mutual co-operation that would be workable. The only way this can be achieved is through a regular exchange of viewpoints. In this way the dealer would be able to air his complaints, and understand the situation of the utility. This would go a long way to remove the only too general antagonism toward the gas company today. For there is a general feeling among many dealers that the utility assumes an attitude of indifference toward them, and that its co operation is on a partial rather than an all-out basis. This idea should be corrected.

Mutuality of interest should be the keynote of utility-dealer association. However, it must be remembered always that the functions of the two are absolutely distinct, the gas company being primarily concerned with the production and sale of fuel, the dealer with the sale at a reasonable profit of the appliance. This means that if the gas company is to play a successful role in the mutual partnership, it must remember that its chief function is to furnish the public with fuel and service, and that the merchandizing of appliances should be of secondary consideration. Where the utility has adopted this policy, the results have been salutary.

This does not mean, of course, the withdrawal of the gas company from the merchandizing field. In the case of a preponderant proportion of the gas companies this would be impossible, making even the suggestion of such action fallacious, for to abandon merchandising would be to lose a large portion of its normal load. It will be only when effective and satisfactory dealer outlets have been developed competent to undertake without prejudice to the utility a part of its promotional activities.

A Fair Profit to the Dealer

An important factor in the maintence of good utility-dealer relations would seem to be the equalization of profit potentials of gas appliances with those of competing fuels. In other words, the utility must be willing to sell their appliances at prices that will allow the retailer to make as much profit as from competitive appliances. This, of course, means the abolition of the practice of price concession to gas customers, a form of competition which the dealer can not afford to meet. In other words, there must be absolute equality of selling opportunity, and this whether the sale is consummated by the utility or the dealer. This is a matter of the utmost importance.

Another important thing to remember is that full dealer co-operation is impossible where the gas company attempts to control the sale of any particular appliance. Common justice would seem to dictate that all appliances should be made available by the manufacturers to every dealer on the same terms, territorial distinctions, of course, being taken into consideration.

Sell the Appliance the Customer Chooses

Far-sighted executives, also, are beginning to realize that the utility errs in insisting on selling only the appliances of certain manufacturers. Might it not be better if the gas company's and the dealers' salesmen could sell any character of equipment that meets fully the specifications and restrictions of the A. G. A. Testing Laboratories. In other words, should not the choice of equipment rest with the ultimate purchaser, the gas consumer? Under such circumstances, it would appear reasonable to suppose, sales resistance in gas appliances would be greatly lowered. And, after all, this is the main desideratum in the promotion of gas as a fuel.

Fundamental to all utility-dealer relations must be the realization on the part of the gas company that no one is in better position to familiarize himself with community conditions than the retailer. It is upon his knowledge and experience that most consumers rely. Furthermore, he has as a rule an intimate knowledge of the peculiar conditions that apply to a particular neighborhood. Thus, fundamentally an artisian, he can be developed into a good salesman for the gas company.

Utility to Control Standard of Appliances

In a discussion of utility-dealer co-operation in the merchandizing field, it should be stated as axiomatic that the utility should be in a position always to control the standard of appliances. Failure to do so in the past has been a pitfall for many otherwise well-conducted companies. Eternal watchfulness must be exercised to maintain the standard of appliances using the company's lines. Only appliances that will render consistently good service should be permitted installation. When a given piece of equipment fails to give satisfactory performance, it is the fuel, as a general rule, that is considered at fault. Seldom do customers even question the efficiency of the appliance, which they themselves have selected.

Another very important reason for the company's maintenance of appliance control is the matter of servicing, which is expensive, and especially so in the case of improperly designed and inefficient appliances. The well-managed gas company has its sales force under continuous direction, and thus is able to control its activities at all times. This, of course, is not the case with the average retailer, whose chief, oftentimes single objective is the sale of the appliance, regardless of type or the fuel it burns. This is the reason why the utility should be vigilant always in seeing that only the type of appliance it is willing to service should be installed. Such a policy will be fundamental insurance against much grief.

To go forward as it should, gas should control the new home field. This means that if gas is to retain its domestic load it must be in the van in the new housing programs, and this for the very obvious reason that the average housekeeper will regard the equipment of the new home as the ultra modern standard, and will be greatly influenced by the technique in any plans she may have for the modernization of her own home.

Contact the Architect

Prior to the war, the Philadelphia Gas Works Company maintained an elaborate kitchen exhibit in the Architects' Building, of that city, to serve as a liaison medium between the utility and the architects. It was in charge of a registered architect, competent to discuss with his fellow craftsmen the intricate problems of the profession, and to collaborate with them in the creation of designs. It proved a successful medium in the promotion of gas, and was temporarily discontinued only because of the exigency of war. The gas company in every large urban community should follow this example.

It is estimated by that most reliable of authorities, the F. W. Dodge Corporation, that for the decade following the war there will

be an annual demand for urban residences of 820,000 units a year, calling for an expenditure of approximately $2,157,000,000 annually, or an increase of 200 per cent compared with the decade 1930-1939, and more than 25 per cent greater than in the previous ten-year period, which included the so-called "golden age."

Home Building After the War

Unquestionedly, the greatest sphere of national activity after the war will be in the field of construction, residential particularly, and to an extent in planned housing. A well-defined and forceful policy on the part of the Gas industry will be needed to secure a fair proportion of the load. Here competition will be severe, and far-sighted militant action on the part of the utility, especially in the realms of advertising and salesmanship will be necessary. Fundamental to this will be customer fuel acceptance.

Gas has certain inherent advantages over other fuels, particularly in the domestic field, such as greater speed and flexibility and lower maintenance and operating costs. It is important that these advantages should be brought home to the housewife in an effective way. This, of course, means sales promotion, intelligently planned to embrace every accepted medium of publicity—radio, newspaper, magazine, billboard, direct mail and window and floor display. Every gas company should co-operate to the limit of its ability in the national advertising campaigns of the American Gas Association and the Association of Gas Appliance and Equipment Manufacturers and, at the same time, develop a comprehensive plan to promote sales in its own territory. All promotional programs should be prepared well in advance of the coming of peace, so that the industry, able to face any contingency that may arrive, will be prepared to go forward on an even keel.

Public Relations

In connection with advertising and publicity, there is another factor in utility prosperity that has been too long neglected. It is public relations, perhaps as important as any other one factor in the successful management of a gas company. Some of the larger companies have appreciated this, and have set up distinct public relations departments. Others should follow suit, for there is no more effective way to promote understanding, goodwill, and tolerance between the utility and its customers. Perhaps many of the disagreements of the past might have been obviated if there had been a properly functioning department of public relations to meet just such contingencies.

Research

More and more extended research would seem to be another of the gas industry's vital needs, both fundamental and applied. Every gas company in the country should collaborate with the American Gas Association's research program. Especially, should the scope of the Association's laboratories be materially extended. Also the utilities should cooperate in the research work of the manufacturers. Our industry could well take a leaf out of the book of that of Great Britain, which recently has voted to spend approximately $2,000,000 annually for the next ten years in research in addition to that now being expended.

In the opinion of the writer, if the gas utilities plan an aggressive sales campaign, exploring to the full every potential outlet, they will not have anything to fear from other competitive fuels.

Accident Prevention Program of Southern California Gas Co.

By
Fred A. Herr

DEPARTMENTAL supervisors of the Customer Service Department of the Southern California Gas Co., Los Angeles, through a series of educational safety meetings, succeeded in reducing their department's total of lost-time accidents from 46 in 1942 to 13 in 1943, a decrease of 71.8%.

The accident prevention program was planned by Allan Johnson, superintendent of the Central Division Customer Service Department, with the advice and assistance of the Safety Department, headed by E. E. Ellis. This series of meetings, conducted by operating supervisors and attended by the servicemen, served to emphasize the fact that safety is an operating function and that the company's safety department is an advisory staff organization whose function is largely that of coordinating accident prevention activities.

Inaugurated at the beginning of 1943, the program was tailored to the specific needs of the operating department and called for the local supervisors to conduct meetings of the servicemen under their supervision. The servicemen were encouraged to submit suggestions and to participate in the "bull sessions" which followed each meeting. Many excellent operating and safety suggestions were received and in later meetings the servicemen were given an active part in the conduct of the meetings.

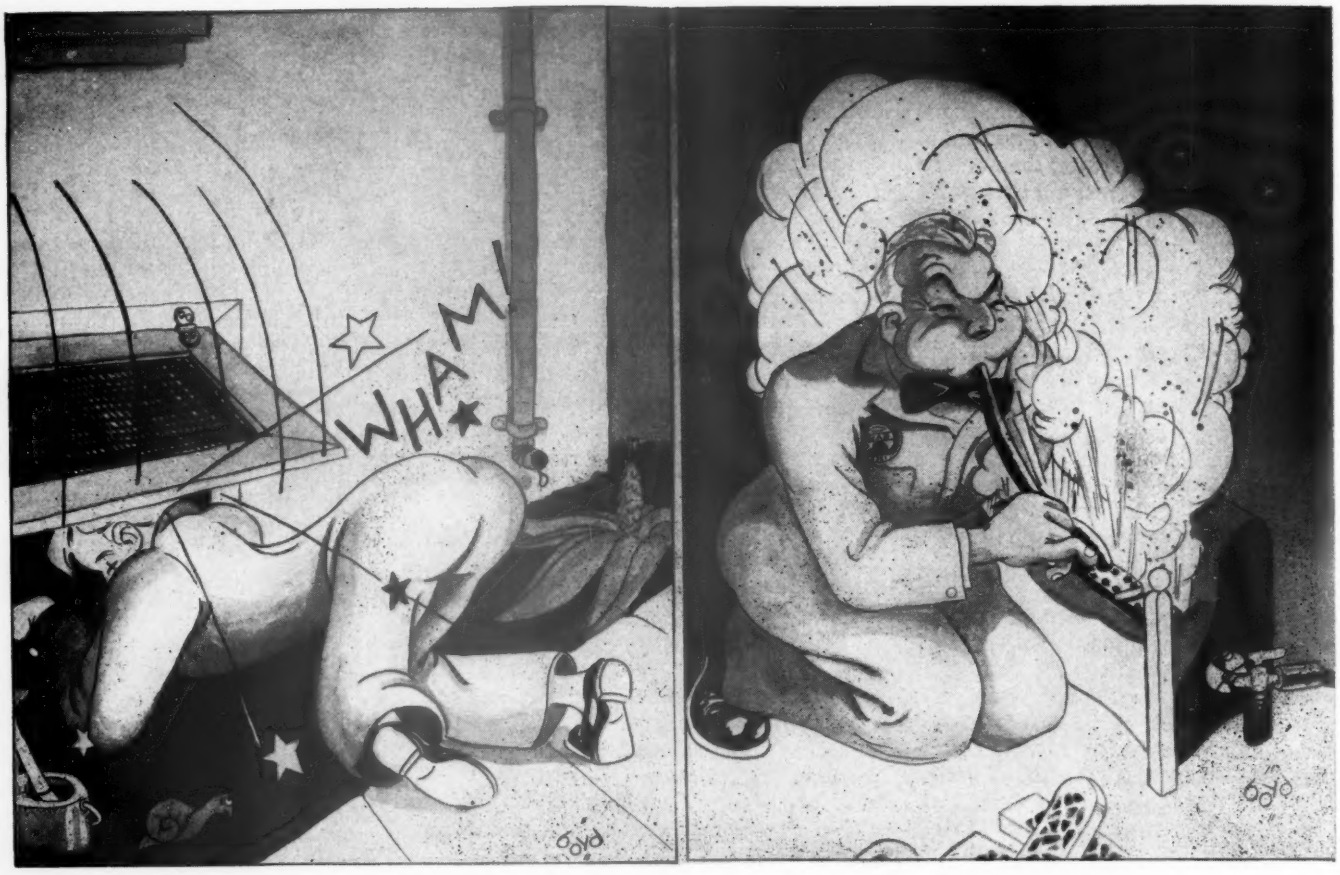
There were four such meetings during the year, covering the subjects of automobile driving, dog bites, flashes and first aid. In each case the supervisor showed a slide film prepared specifically for the meeting and was guided by a script outlining the commentary.

Auto Accident Hazards

The first meeting—on automobile driving—was illustrated by Kodachrome slides. The equipment and personnel in the pictures were familiar to the men, since company cars and a well known employee were used. In this meeting various common accident hazards were highlighted effectively enough to cause an immediate reaction in the accident graph.

The second session, held approximately 60 days later, dealt with the subject of dog bites, a particularly vexing problem in metropolitan Los Angeles, where city health authorities estimate the number of dogs in the city at approximately 750,000 (251,000 licensed dogs and from two to three unlicensed ones for each licensed one). Since gas company servicement must enter houses where dogs are kept, this session dealt with pertinent information gathered from informal sources on how to avoid being bitten.

The subject at the third meeting was "Flashes." Slides and talks em-



Meter doors of the "innocent" type
Lay in wait till the victim is ripe.
Then they take a toboggan
and land on his noggin.
—That's what Joe found;
Now he's seen the light!

Take a leaf out of Joe Gasman's book:
Guard your eyesight—by hook or by crook.
When the air's full of dust,
Or old match heads and rust,
Close 'em tight till the air clears—
THEN look.

phasized the hazards to which servicemen expose themselves if they fail to follow approved practices in the servicing of previously inoperative or defective water heaters, space heaters and furnaces. The painful results of inattention and disregard of instructions in the matter of flashbacks, which can occur when these appliances are relighted by servicemen, was demonstrated by another series of slides at the third session.

A fourth meeting dealt with the use of pocket size first aid kits which the Southern California Gas Co. furnishes to its customer servicemen. The workers were instructed how to use each of the various first-aid materials in the kit and were shown typical instances of how minor injuries are incurred. Also stressed at this meeting was the importance of the company policy requiring immediate report of all injuries, however slight.

Cartoons Aid Program

By means of cartoons posted on bulletin boards in the customer service department and given prominence in the firm's house organ, "GAS NEWSWEEK," the various methods by which customer servicemen may sustain injuries were highlighted. Subjects treated in the series of drawings began with one depicting what may happen to that symbolic character, "Joe Gasman," when he blithely enters the yard of a customer without ascertaining the presence, and the temperament, of the family dog. Other cartoons illustrated personal injuries that can result from improper handling of wrenches when the serviceman is squatted in an awkward position before a low-mounted meter; the danger of head injuries to the worker who ignores the possibility of the door of a meter opening slamming down on his head; the hazard to eyes that exists for the serviceman who attempts to clean a space heater without protecting his eyes; and the hazard of injury from flashbacks.

Each bulletin contained a verse which further emphasized the "point" being made in the cartoon. Samples

To emphasize the various methods in which customer servicemen may sustain injury on the job through carelessness or inattention to prescribed methods of operation, the Southern California gave prominence to a series of drawings during an educational program conducted in 1943 to reduce the number of accidents to servicemen. The program was so successful that a reduction of 71.8% in lost-time accidents was recorded in 1943 as compared with 1942.

of three of the cartoons with verses are shown.

That the program was a success in the Customer Service Department is shown by figures taken from the accident record files which are kept on a monthly basis by the Safety Department. The record sheets list man-hours worked; the number of employees in the department each month; number of lost-time accidents; lost-time accidents per one thousand hours worked; total accidents per month and accumulated total for 1942; and total accidents similarly compiled for 1943.

	Number of Workers	*Man Hours Worked*	*Lost Time Accidents*	*Lost-Time Accidents Per 1000 Hours Worked*	*Month by Month Total Accidents in 1942*	*in 1943*
January	414	76,000	0		6	0
February	402	67,000	1	.015	13	1
March	392	75,000	1	.013	18	2
April	375	70,000	2	.029	25	4
May	348	62,000	2	.032	30	6
June	345	61,000	2	.033	33	8
July	339	61,000	1	016	35	9
August	333	58,000	2	.034	36	11
September	328	61,000	0		39	11
October	322	66,000	1	.015	43	12
November	322	66,000	0		45	12
December	320	67,000	1	.015	46	13
		790,000	13		46	13

Substantial Accident Decrease

During 1942 (before the accident prevention program had been inaugurated) the Customer Service Department of the Southern California Gas Co. worked a total of slightly more than one million man-hours and experienced 46 lost-time accidents. During 1943 (when the safety meetings were held) the man-hours totaled 800,000 and the lost-time accidents only 13. The frequency rate, based on the National Safety Council formula for number of accidents per million hours worked, was 46 in 1942 and 16.2 in 1943. The percentage decrease of lost-time accidents in 1943 as compared with the previous year was 71.8 per cent.

The company's accident record files show that not more than two lost-time accidents occurred to personnel of the Customer Service Department in any one month in 1943. No accidents took place in three of the months—January, September and November; and only one mishap serious enough to cause the worker to lose time was recorded in February, March, July, October and December. The number of workers involved ranges from a low of 320 in December to a high of 414 in January.

The month-by-month record of accidents in the Customer Service Department for the year 1943, with the comparative figures for 1942, is shown in the following table, which reflects the splendid results accomplished by the company's accident prevention program:

While working on this number three
Joe Gasman "blew up" as you see
With his wrench at an angle
And those legs in a tangle
One slip, and he's on P & D.

Decreased Auto Accidents

The automobile accident record of the Southern California Gas Company's Customer Service Department also reflected a substantial reduction in number as a result of the educational meeting held early in 1943 to familiarize employees with recommended methods of operating the cars used in customer service work.

During the five months following the meeting, which was held in May, 1943, the department had an automobile accident experience of 5.4 minor collisions per 100,000 miles of driving, including all damage to a car, however slight. The records reveal that accidents to servicemen's cars for the four months preceding the safety meeting were: January 3.5 accidents per 100,000 miles; February, 6.2; March, 5.7; and April, 5.9.

Effects of the lessons learned by the servicemen at the safety meeting were reflected in the driving record of the four months immediately following the May meeting: May, 4.0 accidents per 100,000 miles of driving; June, 3.9; July, 3.8; August, 4.1s. The average for September jumped to 7.3 due to several fender bumpings which, though only slight damage to the car was done, were included in the record.

The increase in the number of accidents in September indicated to the Safety Department the probable advisability of repeating at meetings from time to time the information presented to the drivers at the May, 1943, session, so that the safe-driving instructions could be reemphasized at intervals during the year.

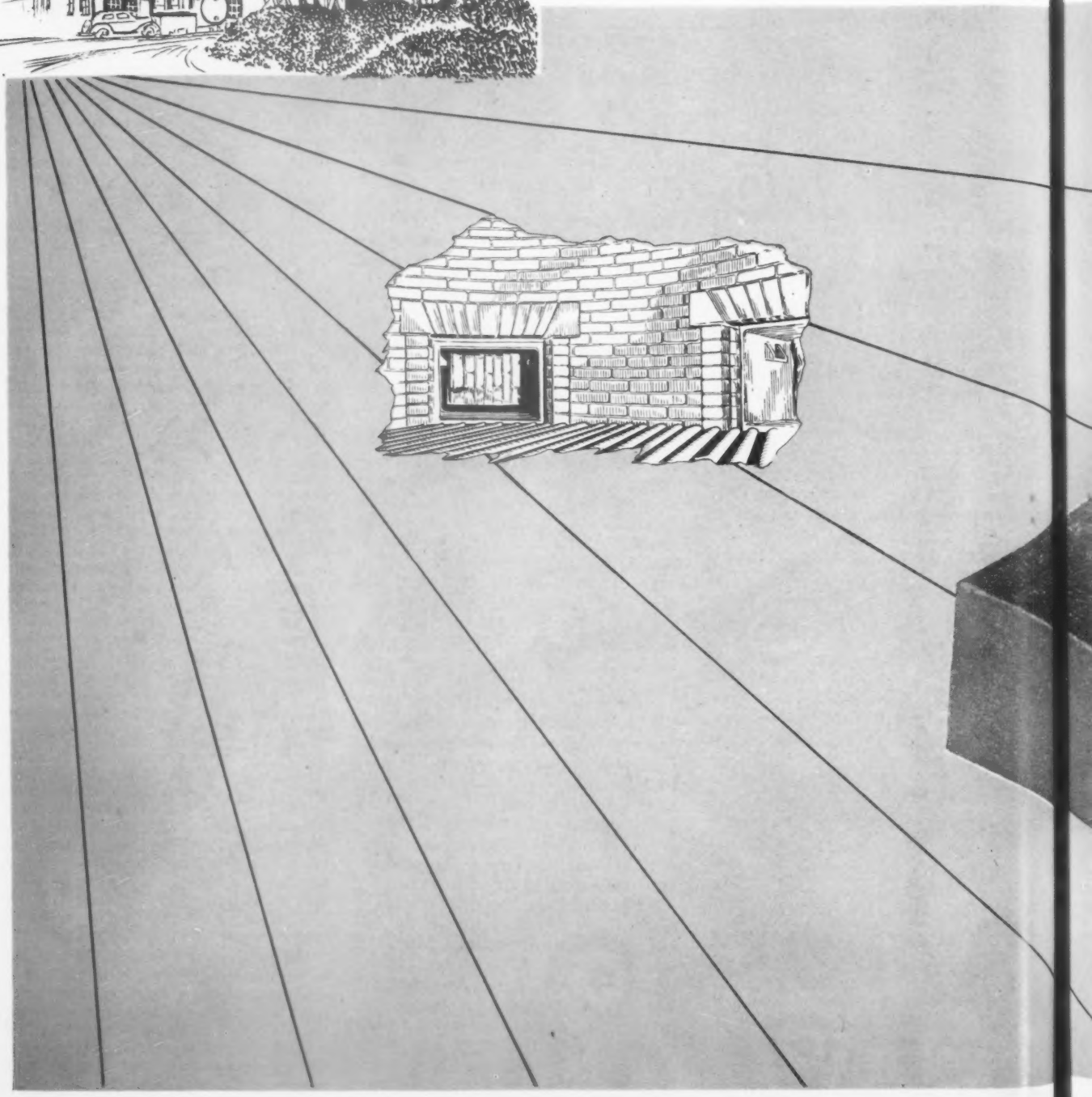
Pipeline Being Enlarged to Increase the Supply

A construction project that will make more natural gas available in the San Francisco Bay area and thereby further aid the government's oil conservation program is being put through by the Standard Pacific Gas Line, Inc., a corporation formed in 1930 by the Standard Oil Company of California and the Pacific Gas and Electric Company. This corporation —known in the industry as "Stanpac"— was organized for joint construction and operation of a large pipeline to transmit natural gas from the Kettleman Hills oil fields to San Pablo, Contra Costa County, where it ties in with the network that serves the East Bay territory. However, soon after Pearl Harbor a great portion of this pipeline was released at the request of the Navy for the delivery of oil to refineries in the Bay area and since then Stanpac has cooperated with the P. G. and E. in providing facilities to transmit increased quantities of natural gas from the Rio Vista field, about 60 miles northeast of San Francisco.

Stanpac's new project will substantially increase the capacity of a transmisison main, of 8-inch and 12-inch pipe, which extends from the east side of the Rio Vista field to San Pablo. As one part of the job, a 6580-foot stretch of 8-inch pipe has been replaced with 16-inch pipe. In addition, 24,350 feet of 16-inch pipe is being laid parallel to another stretch of 8-inch line.

The project will cost $227,000 and will be completed by May. It will assure a considerably greater supply of natural gas for a wide variety of industries in Contra Costa County, including several huge oil refineries, three large P. G. and E. electric generating plants and a number of manufacturing establishments.

Save time and money . .



. . . with CRYSTOLON brick

NORTON CRYSTOLON Brick are bringing real savings in time and money to operators of water gas sets. Used to line the fire zone of the generator, these densely-made brick resist the penetration of clinkers so that the set need be open only briefly for clinker removal. Major repairs, even patching, are seldom necessary with CRYSTOLON Brick which, because of their high refractoriness and great ruggedness, perform well through more than 22,000 hours of actual gas-making time.

R-873

NORTON COMPANY
WORCESTER 6, MASSACHUSETTS

Norton Longer Lasting Refractories

Report of U. S. Housing Projects Committee of the Sales Division of the New England Gas Association

Introduction

A COMMITTEE of the Sales Division of The New England Gas Association has been working two years on a study of United States Housing Projects in New England. The purpose of this study was to determine the rates—both gas and electric—and the other concessions offered by the utilities to obtain this type of government business. An effort was also made to obtain the electric and gas consumptions of these housing projects on a per-dwelling-unit basis and the cost of these services.

Apparently, there is no standard or uniformity in either the type or price of the rate offered by either the gas or electric utilities. There is a wide variation in the price and type of rates offered to the government. The governing factor in practically all cases was the type and price of rates offered by the competitor.

It would seem hard to analyze the cause for the wide variation in both gas and electric services used per dwelling unit in similar types of installations. Some factors which effect this divergent amount of gas and electricity used are the number of rooms per dwelling unit and whether the gas and electric bills were paid by the consumers or by the government.

It should be remembered that utility rates or fuel cost are not the only factors which determine the selection of fuel used for the different domestic uses. The factor which controls the government selection of the fuel used for domestic use—such as cooking, refrigeration, water heating and space heating—is the total cost per dwelling unit for each of these domestic operations respectively. The factors from which the annual cost of the per dwelling unit is determined are as follows:

1. **Fuel cost.**
2. **Maintenance cost.**
3. **Service cost.**
4. **Amortization and interest based on the initial investment of the appliance.**
5. **Cost of reading meters.**
6. **Transformer cost if any.**

Summary of Study by U. S. Housing Projects Committee of N.E.G.A. Sales Division 1-22-44

Location and Utilities	Dwelling Units	Use	Fuel	Average Use	Average Cost	Gas Rate	Electric Rate
Boston, Mass.							
1. Boston Cons. Gas Co.	1092 SC	Cooking W. Heat. Refrig. Central heating plant	Gas Coal Elec.	1490	$.93	2 Mcf $2.80 23 Mcf @ .80 75 Mcf @ .75 Over 100 Mcf .60 Plus fuel clause	Demand $85.00 first 25 kw 3.00 per kw 45 kw 2.50 per kw 800 kw 1.60 all over Energy 2.0¢ kwh 9000 kwh 1.2¢ kwh 10,000 kwh .75¢ all over Plus fuel charge 110 v
2. Boston Edison Co.	396 SC	Cooking W. Heat. Refrig. Central heating plant	Gas Coal Elec.	1480 74	$.98		
3.	874 D	Cooking W. Heat. Refrig. Light Central heating plant	Gas Coal Gas Elec.	Total 3840 69	$1.74	$.65 per Mcf for first 500 cu. ft. per dwelling unit $.40 per Mcf for all additional gas	
Charlestown, Mass.							
4. Boston Cons. Gas Co. (gas & elec.)	1090 SC	Cooking W. Heat. Refrig. Light	Gas Coal Gas Elec.	Total 2930 51	$1.30	"	Same as Boston Edison above
Boston, Mass.							
5. Boston Edison Co.	1016 SC	Cooking W. Heat. Refrig. Central heating plant	Elec. Coal Elec.	Total 169	$2.22	No gas in project	Demand $1.00 per mo. per kw in excess of 1 kw per apt. Energy 3.0¢ per kwh 30,000 kwh 1.5¢ per kwh 40,000 kwh .6 all over Plus fuel clause (12800 v)
Ayer, Mass.							
6. Boston Cons. Gas Co. Wachusett Elec. Co.	304 D	Cooking W. Heat. Refrig.	Gas Gas Elec.	Total 2340 87	$1.46	3M $4.84 22M @ .85 75M @ .80 Over 100M .65	Demand $12). first 80 kw $1.50 kw all over Energy 20 mills per kwh for first 100 hrs. use of demand, 15 mills for next 100 hrs. use 8 mills for all use in excess of 300 hrs. use. Subject to 5% discount and fuel charge 2300 v
Fall River, Mass.							
7. Fall River Gas Works Co. Fall River Elec. Lt.Co.	357 SC	Cooking WH. Heat. Refrig. Light *Hot water supplied by central plant in winter Gas co. adjusts appliances free	Gas Gas Gas Elec.	Total 3240 28	$2.25 1.00	Basic charge $25.60 for 47800 cu. ft. annual per dwelling unit Adjustment .50 per M gas used over or under basic amount. Plus fuel clause Co. checks individual meter 4 times a yr.	10 cwh @ 5.0¢ 10 kwh @ 4.0¢ 20 kwh @ 2.0¢ Excess @ 1.5¢ Minimum $1.00 per mo. per unit
Waterbury, Conn.							
8. Comm. Lt. & Pr. Co.	300 D 2 Projects	Cooking W. Heat. Refrig.	Gas Gas Elec.	Total 5775 100	$5.16 2.89	Cooking $.812/3 /Mcf plus fuel charge Cooking and w. heating $.70/ Mcf plus fuel charge	
		Note: Company owned distribution system. Housing pays rental 15% on electric and 12% on gas system.					
North Weymouth Mass.							
9. Old Colony Gas Co. Weymouth Lt. & Pr. Co.	100 D	Cooking W. Heat. Refrig.	Gas Gas Elec.	6041 97	$4.00 plus fuel $0.16 $2.19	2M-7.44 Next 96M @ .81 All over @ .62 Plus Fuel Charge	Demand - none Energy per dwelling unit 10 kwh @ 5.0¢ 10 kwh @ 4.0¢ 20 kwh @ 2.0¢ All over 40 @ 1.5¢ Plus fuel charge
		Note: Distribution system owned by government					
Newport, R.I.							
10. Newport Gas Lt. Co.	538 D	Cooking W. Heat. Refrig. Free appliance service and individual meter reading by gas co.	Gas Gas Elec.	3510	$2.10	4Mcf $4.20 Next 730 Mcf .80 All over .40 Plus fuel charge	2300 volts delivery $2.00 demand per kw for first 100 kw; $1.50 demand per kw for all over 100
11. Newport Elec. Corp.	262 D	Cooking W. Heat. Refrig. Light, etc. Free appliance service and individual meter reading by gas co.	Gas Gas Elec.	5540	$2.73	4 Mcf $4.00 Next 336 Mcf .75 All over .35 Plus fuel charge	3¢ first 1000 kwh 2¢ next 4000 kwh 1 1/2¢ all over 5000 kwh Fuel charge $.0001 per kwh per 10¢ ton increase over $5.
12.	600 D	Cooking W. Heat. Refrig. Gas ranges serviced free	Gas Oil Elec.	1800	$1.17	4 Mcf $4.20 Next 816 Mcf .80 All over .40 Plus fuel charge	2300 v
Pawtucket R. I.							
13. Blackstone Valley Gas & Elec. Co.	331 D	Cooking W. Heat. Refrig. Central heating plant	Gas Coal Elec.	1410 51	$.97 $1.03	$.70 per Mcf for first 800 Mcf per dwelling unit $.55 per Mcf all over plus fuel clause	$1.25 per kw demand 1.5¢ kwh first 40 1.25 next 40 1.00 all over 80 3400 v

On some projects the selection of the fuel used by certain appliances was based on the willingness of the utilities to make concessions on some of these factors other than the cost of fuel. Utilities making such concessions are listed in the report.

This report should be particularly helpful to those gas utilities interested in this type of government business during the war for defense clearance projects or in the post-war period for slum clearance projects. A study of this report will show what rates and what utility concessions were made by both the gas and electric companies in securing the use of their fuel for domestic appliance uses. The charts will give a more graphic picture of the rates offered for a particular use or a combination of uses of gas in these projects.

Roy E. Wright
Chairman, Sales Division

Summary of study by U.S. Housing Projects Committee (Continued)

Location and Utilities	Dwelling Units	Use	Fuel	Average Use	Average Cost	Gas Rate	Electric Rate
Lawrence, Mass.							
14. Lawrence Gas & Elec. Co.	292 RC	Cooking W. Heat. Refrig.	Gas Coal Elec.	1120 60	$1.12 1.35	300 M @ $1.00 M All over @ .75 M Plus fuel charge	Demand $1.50 per kw Energy 250 kwh x demand @ 1.5¢ kwh All over @ 1.2¢ / kwh Plus fuel charge 2300 v
		Individual gas meters read and separate services run by gas co.					
New Haven, Conn.							Demand
16. New Haven Gas Lt. Co.	1035 SC	Cooking W. Heat. Refrig.	Gas Coal Elec.	1220 67	$.84 $1.44	50 Mcf $45.00 Next 150 M .70 Next 300 M .65 Over 500 M .50	$15. no. first 5 kw $2.00 next 25 kw $1.50 next 110 kw $1.25 over 150 kw Energy 2.0¢ first 3000 kwh 1.6 next 7000 kwh 1.4 next 20,000 kwh 1.0 all over Plus fuel charge 2300 v
		Gas appliances serviced free					
Stamford, Conn.							
16. Connecticut Power Co.	146 SC	Cooking W. Heat. Refrig.	Elec. Coal Elec.	188 143 kw demand	$4.25		First block 30 hrs. use of first 40 kw 24 hrs. use of 55 kw 20 hrs. use of additional First block 8.0 / kwh Next 50 kwh @ 6.0¢ Next 200 kwh @ 4.0¢ Next 800 kwh @ 3.0¢ Next 6000 kwh @ 2.0¢ All over @ 1.5¢ Plus fuel charge 2300 v
		Utility furnished substation					
17.	250 SC	Cooking W. Heat. Refrig. Light	Gas Coal Elec. Elec.	1440 86	$1.08 $1.84	100 cu. ft. $.62 19900 " " @ 1.20 50 M @ 1.00 30M @ .70 All over @ .65 Plus fuel clause	
		Utility furnished elec. substation					
Norwalk, Conn.							Not available
18. Comb. Lt. & Pr. Co. Municipal Elec. Plant		Cooking W. Heat. Refrig.	Gas Coal Elec.	1500 82	$1.29 2.12		Average per kwh Energy $.0184 Demand .0074 Total $.0258
		Central heat					
Portsmouth, N. H.							Special rate:
19. Wentworth Acres New Hampshire Gas & Elec. Co.	800 D	Cooking W. Heat. Refrig. S. Heat.	Propane Propane Elec. Coal	Total 980 cu.ft. 86	Gas and Elec. cost averages $5.90		Demand charge $1.50 per kw of demand plus Commodity charge 1 1/2¢ per kwh plus fuel clause $.00007 per kwh 10¢ over $6.25 or under $5.25 per gross ton 2300 v
		Gas furnished by project plant Utility furnished substation					
19a. Pannaway Manor New Hampshire Gas &Elec. Co.	D	Cooking W. Heat. Refrig. S. Heat.	Elec. Oil Elec. Oil				First 4 kwh or less $1.00 Next 11 kwh @ 7¢ Next 85 kwh @ 4¢ All over 100 kwh @ 2.6¢ 110/220 v
		Elec. meters read and separate services run by co. Utility furnished elec. substation Elec. appliances sold through utility					
Kittery, Maine							
19b. Admiralty Village Kittery Elec. Co.	D	Cooking W. Heat. Refrig. S. Heat.	Elec. Oil Elec. Oil				First 20 kwh @ $.10 Next 30 kwh @ .04 Next 100 kwh @ .03 All over 200 kwh @ .025 110/220 v
		Utility installed and reads meters free also ran separate service free Utility furnished substation					
Holyoke, Mass.							
20. City of Holyoke Gas & Elec. Dept.	137 SC	Cooking W. Heat. Refrig. Light	Gas Coal none furnished Elec.	858 38		1M $1.55 1500 cu.ft. @ 1.30 2500 cu.ft. @ .95 All over .80	200 kwh @ 3.70¢ 800 kwh @ 2.30¢ 4000 kwh @ 2.00¢
		Individual meters					
Springfield, Mass.				Total			
21. Springfield Gas Lt. Co. - western Mass. Elec. Co.	300 D	Cooking W. Heat. Refrig.	Gas Gas Elec.	4920	$3.45	5M $4.08 7M @ .80 Over 10M @ .70	Not available
		Gas distribution system owned by utility and leased to government - averages 55¢ per dwelling unit					
Springfield, Mass.				Total			Not available
22. Springfield Gas Lt. Co. Western Mass. Elec. Co.	300 D	Cooking W. Heat. Refrig.	Gas Gas Elec.	4990	$3.51	5M $4.08 7M @ .80 Over 10M @ .70	
		Gas distribution system owned by utility and leased to government - averages 37¢ per dwelling unit					
23.	200 D	Cooking W. Heat. Refrig.	Gas Gas Elec.	Total 2262	$3.08	First 200 cu.ft. $.. All over $1.10 / M	Not available
		Bills paid by tenant Free gas appliance service					
Bridgeport, Conn.							Demand
24. Bridgeport Gas Lt. Co. United Illum. Co.	516 SC	Cooking W. Heat. Refrig.	Gas Coal Elec.	1350 78	$.88 $1.78	10M $11.25 90M @ .90 100M @ .70 300M @ .65 All over 500M @ .50	$15.00 no 1st 5 kw 2.00 /kw next 25 kw 1.50 /kw next 110 kw 1.25 /kw next 150 kw plus Energy charge 2.0¢/kwh first 3000 1.6¢ /kwh next 7000 1.4¢ /kwh next 20000 1.0¢ /kwh all over Plus fuel charge
		Central heat					
25.	600 D	Cooking W. Heat. Refrig. Light	Gas Coal None furnished Elec.	1660 75	$.92 $1.55		
26.	400 D	Cooking W. Heat Refrig. Light	Gas Gas None furnished Elec.	Total 2800 80	$3.62 $1.65		
		No central heat. Tenants obviously use gas range for supplementary heating.					
27.	1240 SC	Cooking W. Heat. Refrig.	Gas Coal Elec.	1090 77	$ .63 $1.33	Same as above	
		Central heat Gas appliance adjustment service free					

KEY TO TABLES

Under Dwelling Units, "SC" denotes Slum Clearance and "D" indicates a Defense Project.

"Average Use" figures for gas are given in cubic feet per month and, where two or more gas uses are supplied, the total figure is given under "Cooking."

"Electric Use" is given in kilowatt hours per month. Cost for both gas and electricity is given in dollars per average month per dwelling unit.

In showing the rates for gas and electricity, the first blocks are sometimes grouped and averaged to avoid unnecessary detail.

Unless otherwise noted, utilities do not agree to render the following services or material:

(a) Installation and reading of individual meters for each dwelling unit.
(b) Servicing appliances.
(c) Furnishing appliance parts.
(d) Running separate services to each building.
(e) Furnishing substation.

Explanation

The adjoining tables give a summary of gas and electric operating costs for the greater part of the Public Housing projects in New England that have been in use long enough to yield reliable figures. The data are useful as a guide in negotiating contracts for future Public Housing Developments. It is evident that the figures do not lend themselves to neat averages—local conditions vary too widely for this. There is, however, a tendency for the operating results to "cluster" in a graph tabulation, offering at least a rough check for group or individual project comparison.

Local conditions were, apparently, a strong influence in the choice of fuels since favorable rates do not always appear to secure the business.

As might be expected, gas and electricity are used sparingly when the tenants pay their own bills. Conversely, gas cooking averages increase sharply where gas is "on the house," especially where central heat is not provided and tenants stoke their own coal heaters. "Average rooms per dwelling unit" has an effect on fuel consumption but there is no apparent reason for the occupants of some projects to display a strong sense of economy in the use

of gas and electricity while others find ways to consume generous quantities of both fuels.

Rate forms and structures vary with the companies, and, in most cities, vary with the projects.

There is a tendency to tailor-make rates for a particular project either by varying the size of the blocks on the ordinary form of step rates or by designing the rate on a "per dwelling unit basis." One company offers a flat rate per M for all gas, depending upon the use of cooking alone or cooking and water heating. Fuel clauses are included in the majority of both gas and electric rates.

Fuel clauses are tied to company purchased cost of fuel, local retail prices of fuel, future taxes, wage legislation, abnormal prices of fuel due to strikes, etc.

This study was originated at the request of Roy E. Wright, chairman of the Sales Division of The Association. Other studies of gas usage in housing projects have been undertaken elsewhere on both a national and a sectional basis. We do not believe, however, that the information obtained was in the same form or gathered for the same purpose as the data in this report. We take this opportunity of expressing our appreciation to the companies that cooperated in obtaining the local information.

Ronald A. Malony, Bridgeport, *Chairman*
Robert E. Finnin, Boston
John Hiller, Portland
Arnot Hirst, Providence
Carl J. Westberg, Springfield

Summary of Study by U.S. Housing Projects Committee (Continued)

Location and Utilities	Dwelling Units	Use	Fuel	Average Use	Average Cost	Gas Rate	Electric Rate
Lowell, Mass.							
28. Lowell Gas Lt. Co. Lowell Elec. Lt. Corp.	536 SC	Cooking W. Heat. Refrig.	Gas Coal Elec.	1130 65	$.70 $1.63	5M $5.75 Next 45M @ .60 Next 250M @.70 Next 200M @ .55 All over 500M @ .45	Demand 175 kw $300. Excess @ $150./kw Energy 5,000 kwh @ 25 mills Next 15,000 kwh @ 15 mills Over 20,000 kwh and up to 20) x demand twelve and 1/2 mills in excess of 200 x demand ten mills Plus fuel clause 110 v
		Elec. co reads individual meters free Gas co. services ranges free also ran separate services free Central heat					
Hartford, Conn.							
29. Hartford Gas Co. Hartford Elec. Lt. Co.	1000 D	Cooking W. Heat. Refrig.	Gas Gas Elec.	Total 4400 74	$2.38 $1.49	5M $6.50 45M .75 950M .65 Over 1,000M @ .50 Plus fuel clause	First block 10¢ kwh Next 200 kwh @ 3.0¢ Next 300 kwh @ 2.5¢ Next 3000 kwh @ 2.0¢ Next 10,000 kwh @ 1.5¢ Size of first block 50 hrs. use of 1st 2 kw 30 hrs. of next 28 kw 24 hrs. of next 65 kw 20 hrs. of next 105 kw Plus fuel clause
30.	221 SC	Cooking W. Heat. Refrig. Central heat Free gas range service	Gas Oil Elec.	1440 74	$.97 $1.60	"	"
31.	500 D	Cooking W. Heat. Refrig.	Gas Gas Elec.	4400 74	$2.71 $1.55	"	"
Cambridge, Mass.							
32. Cambridge Gas Lt. Co. Cambridge Elec. Lt. Co. (same ownership)	821 SC	Cooking W. Heat. Refrig. Light Central heat	Gas Oil Gas Elec.	2900 68	$1.70 + fuel charge $1.42 + fuel charge	27400 cu.ft. @ $15.50 /yr./dwelling unit. Gas used above or before 27400 cu.ft. credited or charged @ 45¢ per M Plus fuel charge	Demand 2 kw no charge All over $1.50 / kw Energy 100 kwh @ 5.0¢ 1900 kwh @ 2.5 3000 kwh @ 2.0 5000 kwh @ 1.6 Plus fuel charge
		Co. furnishes free range servicing labor for 15 yrs. and free refrigerator maintennnce and labor for 12 yrs.					

There are available at New England Gas Association Headquarters, 41 Mount Vernon Street, Boston 8, Mass., charts giving graphic outlines with curves of the gas rates used by the various companies in the New England U. S. housing projects studied by the committee. These charts illustrate more fully and graphically the breaking points and the comparison of the rates offered for certain classifications of gas business in these projects. There are three charts presenting curves: (1) one for successful gas rates offered for gas refrigeration and cooking, (2) one for gas cooking and water heating, and (3) one showing the rates used for the different classifications superimposed on each other.

Any gas company executives who wish to secure copies of these three charts will indicate the basis upon which copies can be supplied. It will be necessary for a draftsman to draw each of these three charts individually. These charts will be reproduced as reasonably as possible. The price will probably be about $3 or $4 per set of three charts.

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Practical Phases of Fundamental Gas Cooking Research on Range Ovens and Broilers

By
K. R. Knapp
Chief Engineer
American Gas Association Testing Laboratories

Various important factors affecting oven performance are briefly discussed and the manner in which constructional features affect them described. Relations between excess air and such factors as area of secondary air openings, free openings through oven bottoms and interior flueways and flue outlet area are explained and a formula developed for expressing this relationship. Its application in the aeration and venting of ovens is also outlined.

Results of studies of insulating materials are given showing the effects of thickness and density on preheating speed and maintaining rates as well as influence on surface and room temperatures.

Relationships are outlined between broiler speed and temperature, as well as the influence of type of burner and use of radiants on the broiler product. Effect of temperature on the broiled product is fully described.

Several applications of flash tube lighters to ovens and broilers, embodying results of studies made using manufactured gas are illustrated and discussed. Refinements in flash tube oven lighting applications resulting from additional studies on natural gas are also included.

ABILITY of modern gas range ovens to perform to the best advantage the services demanded of them, depends on a variety of factors which must be properly coordinated to secure best results. Some may be solved by following generally accepted methods of oven design. Others are of a much more complex nature and require thorough scientific analysis for their solution. Among these may be mentioned such features as speed of oven heating, economy of operation, maintenance of low surface temperatures, cooler kitchens and uniform oven heat distribution. All are intimately related with aeration and venting of the oven.

Recognizing the need for fundamental information on these complex elements of performance and design, the Committee on Domestic Gas Research of the American Gas Association included intensive studies of ovens and broilers as a part of its program on Domestic Gas Cooking Research undertaken at the Testing Laboratories in 1935. Results have been made available from time to time through published bulletins, the first having been issued in 1936. Three others have since been published and two more will shortly be released.

Earlier studies on gas range ovens and broilers were devoted largely to determining effects of flue losses, methods of insulation and input rates on preheating speeds and gas consumption for preheating as well as for maintaining temperatures. Much of the data developed applied also to broiler sections. In addition, valuable information was secured on effects of type of flame on broiler speeds and temperatures as well as influence of temperature on quality of broiled meat. All are covered in Bulletin No. 7.

In Bulletin No. 8, which represents the second devoted to gas cooking research, methods of improving fuel economy and preheating speeds by controlled aeration and venting through means of oven constructional features are treated fully. From data obtained, methods are developed for so proportioning various oven parts affecting secondary aeration and venting of flue products so as to secure the greatest speed and economy of operation from an individual range. Relationships between excess air and essential performance features are established. Additional studies on broiler sections are also covered in this bulletin, these including data on design of aeration and venting features of different types as well as their performance characteristics.

Bulletins Nos. 14 and 17 comprise the latest publications dealing with gas cooking research. Both are devoted to flash tube lighting. Bulletin No. 17, published late in 1943, deals with flash tube ignition of oven and broiler burners from a constant burning top pilot using manufactured gas. It also presents practical methods of application to various types of contemporary ovens.

Some of the high lights of these bulletins as they apply to ovens and broilers will now be briefly reviewed:

Oven Preheating Speed

Studies of a number of different oven designs showed that increase in input rating was accompanied by a decrease in preheating time. The extent to which this took place is evident from the fact that, using average data, an increase in input rating of 100% produced a 35% decrease in preheating time. By use of a special test oven a much greater decrease was found possible, thus indicating that a number of its constructional features had considerable bearing on preheating speed. It was also established that an increase in input rate, other conditions remaining constant, caused a decrease in excess air so that at a given oven temperature about the same total volume of flue gases was discharged from the flue outlet. On the other hand, to maintain constant aeration the flue outlet area must be increased proportionately as input increases. With a given oven, therefore, input rate has a dual effect on preheating time, for the reason that more heat is released

Presented at American Gas Association Technical Conference on Domestic Gas Research, Hotel Statler, Cleveland, Ohio, February 17-18, 1944.

What will the gas range of

the future be like . . . and WHY?

DISCUSSION NO. 1

Burner heads should be

----easy to remove as a teapot cover

----easy to clean as a teacup

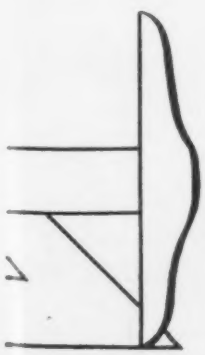
● Any discussion of the gas range of the future naturally revolves about two factors—what is desirable, and what is practical.

We believe the gas industry agrees that improved burner heads are desirable. And, results of present day research bring the conviction that improvement is practical of achievement.

We foresee a burner head infinitely superior to those in use today. It will be finger-light and *removable at the flick of a finger.* A simple mechanism will make it just as easy to replace, with no possibility of incorrect assembly.

It will be made of non-corrosive metal. *Most important,* in case of a spill-over the parts will be so designed that they *can be cleaned in seconds.*

This, we believe, will be the standard for burner heads in tomorrow's gas range—because the public will demand it, and research even now is proving it practical.



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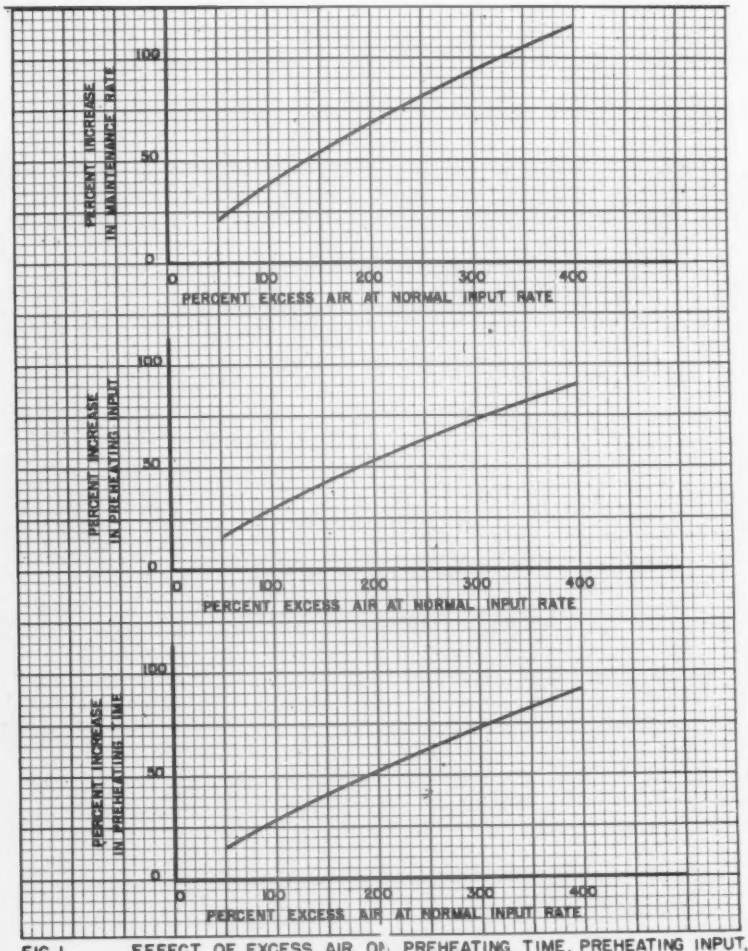

FIG. 1 EFFECT OF EXCESS AIR ON PREHEATING TIME, PREHEATING INPUT, AND MAINTENANCE RATE

for heating up the oven while a smaller percentage of flue loss results due to decrease in excess air. For example, a newly designed oven may be found to have adequate aeration for satisfactory combustion but too long a preheat time. The speed may be increased by increasing the input rate. The secondary air might, however, be reduced to a point where poor combustion would result, thus requiring design changes such as enlargement of the flue outlet to obtain sufficient excess air.

Preheating time is affected to a much greater extent by changes in input rate than is the maintaining rate. For this reason, it may be assumed that satisfactory overall performance can be obtained with an input rate sufficient to provide a reasonably high preheating speed without regarding the effect of input on maintaining rate. Preheating speeds which assure maximum satisfaction to the customer can therefore be used without requiring an appreciably larger gas consumption.

Using the experimental oven previously referred to, effects on preheating time and excess air of various constructional features were successively studied. These included area of secondary air openings in the extreme bottom, passages through the oven bottom above the burner, free area of interior flueways, flue size and location. It was shown that secondary air openings in the bottom larger than 2½ times that of the flue outlet had little effect on preheating time or excess air. Smaller openings, however, restricted flue gas flow. In the case of flue passages in the oven bottoms above the burner no appreciable effect on preheat time or excess air resulted when such openings were at least 4 times that of the flue outlet. Similarly, areas of flueways through side racks for introduction of flue gases into the oven did not affect preheating time or excess air when they were more than 4 times that of the flue outlet. On the other hand, cross sectional area of top flueways for discharge of flue gases from the oven were required to be not less than 1¾ times that of the flue outlet in order that preheating time would not be affected.

Numerous tests were made where flue outlet area, flue height above burner ports and input rates were varied, with other construction features maintained constant. Maximum values of secondary air openings openings in oven bottoms and interior flueways were employed to minimize the effect of these features. Figure 1 is plotted from average data obtained from varying flue outlet areas, flue heights, input rates and types of venting for maximum secondary air opening of 24 inches and maximum oven bottom opening of 40 inches. These figures had been established from previous observations. The curves show that changes in oven construction of the nature described, which increased excess air, also caused a definite increase in preheating time and preheating input. It is evident from Figure 1 that ex-

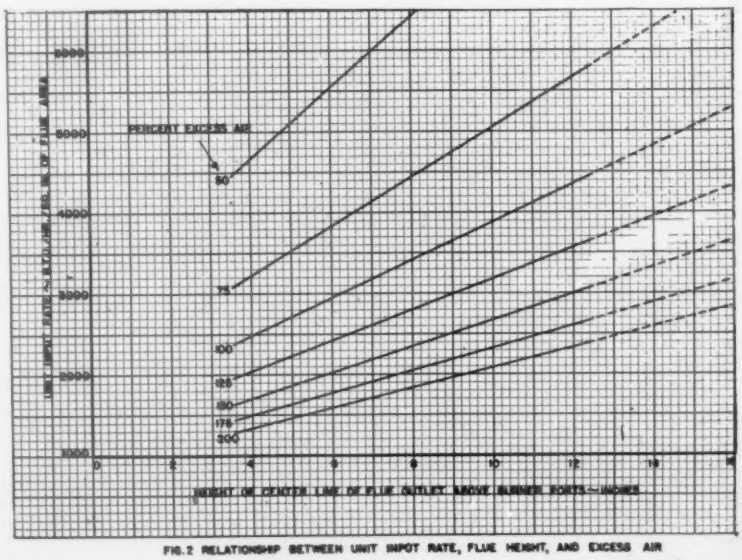

FIG. 2 RELATIONSHIP BETWEEN UNIT INPOT RATE, FLUE HEIGHT, AND EXCESS AIR

cess air exerts the same effect on preheating input as on preheating time; therefore, one may be taken as an indication of the other.

Relationship Between Excess Air and Oven Constructional Features

The curves in Figure 2 have been prepared to show changes in flue outlet area and height above burner ports which produced changes in excess air with corresponding changes in preheating time for different input rates. In all cases the maximum secondary air and bottom sheet openings and internal flue passages were used. These curves indicate a definite relationship between the factors shown. An approximate form of equation expressing this relationship is as follows:

$$A = \frac{I \times E^{0.908}}{15580\ (6.37 + H)} \quad (1)$$

Where:

A = flue outlet area, sq. in.
I = input rate, Btu. per hr.
E = excess air, per cent of that theoretically required for complete combustion, and
H = height of centerline of flue outlet above burner ports, in.

The relationship shown by this formula is apparently applicable to any type of venting and aeration which is generally employed in ovens of the direct-fired type. This statement is premised on the provision that limiting areas for secondary air admission, flue passages through oven bottoms and internal flueways are not less than the values previously indicated.

Oven Aeration and Venting

Relationships between certain operating characteristics and various oven design features have previously been indicated. The following method may be employed in applying them to the best advantage in the design of a particular oven.

Use may be made of equation (1) for determining any one of the factors indicated. Ordinarily the input rate "I" can readily be determined on the basis of the oven volume or by limitations of the capacity of the burner. General oven design will establish the height of the flue outlet "H." Excess air "E" should be the minimum consistent with good combustion. With these factors all known, the flue outlet area "A" would represent the remaining variable. This represents the feature of range construction which would most readily be changed if alterations were later necessary.

In arriving at a value for excess air, it should be kept in mind that some flue gas leakage will occur in all instances. Combustion data from many sources indicate an average value of 150% for excess air may be

$$A = \frac{I \times E^{0.908}}{15580\ (6.37 + H)}$$

Where:

I = input rate, Btu. per hr.
A = flue outlet area, sq. in.
E = excessive percent of heat theoretically required for combustion
H = height of centerline of flue outlet above burner ports, in.

Figure 3: Approximate Form of Equation Expressing Relationship Between Excess Air, Input Rate and Oven Constructional Features

used for the ordinary oven with a common burner for the broiling and baking sections. If the baking oven only is involved and secondary air is admitted directly to the combustion zone, this figure may be reduced to 75%. Whichever figure is employed, it is desirable to use a factor of 0.8 in order to allow for leakage of flue gases such as usually takes place. In this manner the proper figure would be employed for the purpose of the formula.

When the flue area is determined by use of the formula, approximate minimum values may be set for area of secondary air openings, passageways through the oven bottom and side linings and top flue space. As the areas so selected represent minimum values, they can usually be exceeded without increasing the amount of excess air or reducing speed of operation. Usually these areas are fully adequate, but if it should be necessary to secure additional secondary air, this can readily be done by the comparatively simple expedient of enlarging the flue outlet.

Use can also be made of equation (1) as for determining the maximum input rate which a given oven design may accommodate without undue reduction of excess air. In fact excess air represents one of the most important factors to be considered in view of its influence on the performance of the oven.

Substantial decreases in flue losses during maintenance periods may be effected by decreasing the percentage of excess air at normal input rate. Such an arrangement, however, would not be desirable since the excess air might be reduced to such a point that sufficient flexibility would not be provided to meet various operating conditions. A possible way of meeting this objection consists in the use of some automatic means for providing flue restriction during the maintenance period. If by such means excess air during this period would be held to the same value as that at normal input rate, then the flue loss would be substantially decreased. Practicability of accomplishing this result has been demonstrated by a number of oven tests under different conditions, material reductions in maintaining rates resulting.

Oven Insulation and Its Effect on Range Performance

While the most obvious result of the application of insulation to gas range ovens is to produce lower exterior surface and room temperatures, oven speed and economy are both affected by it. Preliminary studies on several "loose" rock or mineral wools and "board" impregnated wools showed differences in their insulating values were due almost entirely to densities. Combinations of air space and solid insulation as well as shiny or reflecting surfaces were likewise investigated. Compared with mineral wool, such types were found to offer little advantage from a performance standpoint. Furthermore, investigations were therefore restricted to long fiber mineral wool of various densities. As this represents a product generally employed for range oven installation, resulting data are capable of direct application. In view of the use of a specially constructed test oven in this work, the performance secured may be considered as somewhat superior to that of which commercial ranges would be capable.

Considering insulation densities of 8 and 12 pounds per cubic foot in thicknesses from 1 to 3 inches, little gain in preheating speed was secured with thicknesses above 1½ inches. Use of thicknesses over 2 inches reduced heating speed on account of the increased amount of heat absorbed. Maintaining rates decreased slightly with increase of insulation densities. This is significant in that it indicates the advantage of using insulation sufficiently compact so as to avoid sifting or settling. Increase in thickness of insulation materially decreased maintaining rates although not in direct proportion. This will

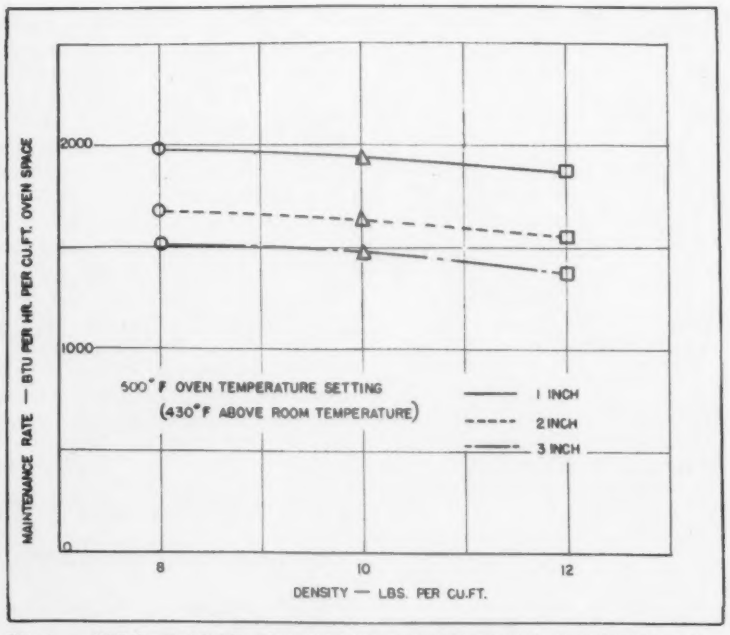

FIG. 4 EFFECT OF DENSITY OF INSULATION ON OVEN TEMPERATURE MAINTENANCE RATE

be evident from Figure 4. By correlating extensive test data, it was shown that reduction in gas consumption by use of 1 inch of insulation was about 32% while with 2 inch thickness it was only 43%.

Settling of insulation as a result of transportation and handling, naturally results in a loss of effectiveness. This can readily be avoided by selection of a minimum density above which settling will not occur. From observations made, proper densities of insulation for use in columns of different heights to prevent settling can be stated. These vary with the material employed. For long fiber rock or mineral wool minimum densities varied from 8½ pounds per cubic foot for a column 15 inches high to 11 pounds for one 35 inches high. Slightly lower values may be used for similar insulation of medium length fiber. For glass wool, densities were from 2½ to 3 pounds for all heights. These figures applied to from 1 to 3 inches.

From the customer's standpoint, reduction in range surface temperatures as well as lowered kitchen temperatures represent major considerations. As insulation not only reduces heat losses to the oven wall but flue loss as well, it is doubly important in reducing kitchen temperatures through reduction in the amount of heat liberated into the room. Surface temperatures, as would be expected, are reduced by increasing either the thickness or the density of the insulation employed. Using a test oven maintained at 500°, an increase in thickness from 1 inch to 3 inches reduced the average weighted surface temperature above that of the room by about 30%. With thickness unchanged, effect of varying density was much less pronounced.

Closely allied with oven insulation is the question of reduction of heat losses occurring through metal to metal contacts. Using the experimental oven with all metal to metal contacts between inner and outer walls eliminated, it was possible to bring about a reduction of 36% at 500° oven temperature. An increase in insulation thickness more than any reasonable amount over that used on modern ranges would have been necessary to accomplish such a reduction in maintaining rate with former metal to metal contact maintained.

Broiling Speed and Temperatures

The most striking difference between broiler and oven sections is the method of heat transfer utilized in the cooking process. Oven cooking is effected principally by convected heat and by radiation. Broiling, on the other hand, is accomplished mainly by direct radiation from flames, radiants or metal surfaces, all of which are maintained at comparatively high temperatures. For this reason, special attention must be devoted to design and materials of construction to meet special conditions which these factors impose. It is also necessary to keep in mind that as contrasted with ovens several different types of broilers are in use. In the case of the most commonly used combination oven and broiler, the same general relationships between excess air and different constructional features previously described for ovens apply. Broilers separate from ovens present a considerably lower height of flue outlet above the burner. As effective draft is thus reduced, some modifications are necessary in the application of equation (1) formerly mentioned to give desired results.

Broiler performance, so far as speed of preheating and fuel economy are concerned, was found to be improved by reduction in excess air with resultant lowered flue losses. Thickness and density of insulation also affected broiler performance in much the same way as was the case with ovens. While use of more insulation accomplishes a reduction in heat loss through the exterior walls with attendant higher interior temperatures, a greater mass of insulation with its higher capacity for heat absorption tends to increase the time required for preheating. In addition to the factors mentioned, the use of radiants, type of flame whether luminous or non-luminous and input rate exert an important effect on broiler speed and temperature. These features were thoroughly explored. For the measurement of temperatures, special thermocouples were employed. Temperatures so determined were found to give a reliable and reasonably accurate indication of the effectiveness of the broiling operation.

The graphs presented in Figure 5 show the comparative speeds and temperatures obtained in the same broiler section, equipped as indicated, with an atmospheric burner with or without radiants and with a luminous flame burner. Better performance was given by the yellow flame burner as will be seen from a comparison of the middle and bottom groups of curves. Its use also resulted in much higher speed of heating as well as generally better heat distribution when approximately the same input rates were employed. Additional tests showed that with the range of normal broiling temperatures, assumed as between 600 and 700°, atmospheric burners required from 45 to 60% greater gas input than luminous flame burners to produce the same broiler temperatures. Broiling of meat cakes by luminous and ordinary blue flame burners indicated better performance was obtained from yellow flames. By their use a moist tender product resulted up to temperatures where exterior charring

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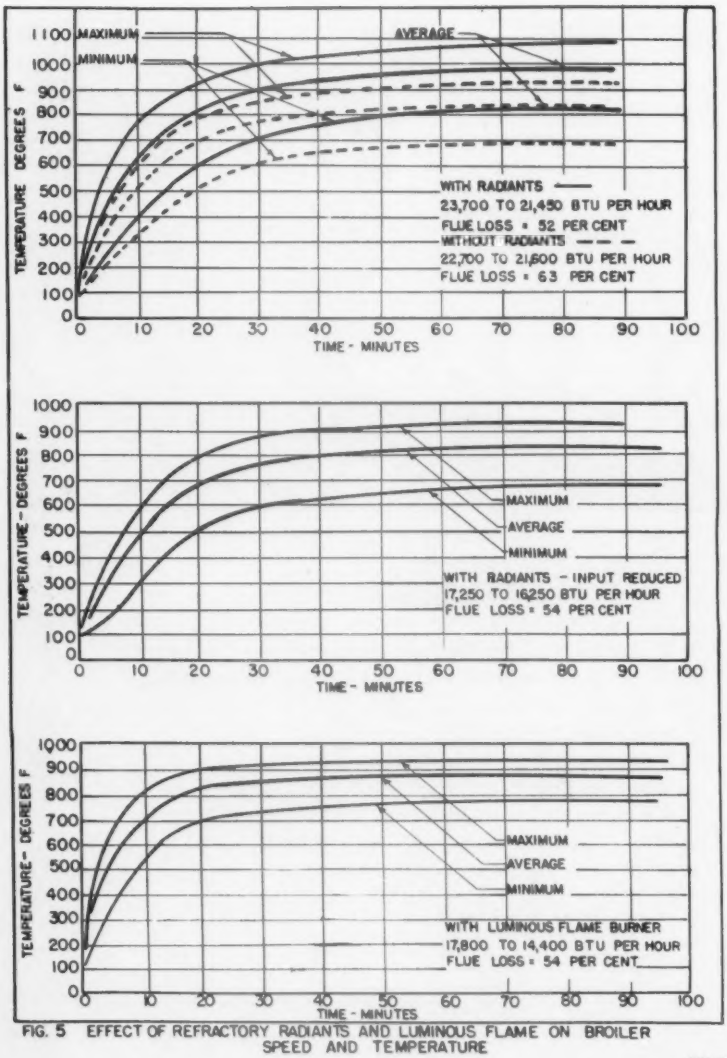

FIG. 5 EFFECT OF REFRACTORY RADIANTS AND LUMINOUS FLAME ON BROILER SPEED AND TEMPERATURE

NO. 919

took place. When blue flame burners were used, a definite crust was formed of about the same thickness at all temperatures employed. Shrinkage of meat was also greater with the blue flame burner.

Although these results favored luminous flame burners for broiling, it must be kept in mind their successful application introduces some additional problems of aeration and baffling. Other tests also indicate that the better performance of luminous flame burners may have been caused not only by the greater radiation from the flames but by their greater length and extent in respect to the broiler rack. When blue flame burners with reduced port areas were employed, the gas input remaining constant, longer flames resulted which gave higher speeds and broiler temperatures closely approximately those obtained with yellow flames.

Broiling tests using filet mignon 1 inch thick, as well as 3 inch diameter cakes of ground round steak of different thicknesses demonstrated that quite similar broiling results would be obtained over a wide range of temperatures. While at lower temperatures, a longer time was required to reach the same internal temperature or degree of "doneness" of the meat, little difference could be detected in its quality. It was also shown that for any given thickness of steak, a maximum broiling temperature existed which could not be exceeded without burning the outer surface of the meat before its interior was heated to the desired temperature. This temperature ranged between 140 and 150°. Permissible maximum broiling temperature was found to decrease as the thickness of the steak increased. For general broiling purposes, it appears that a satisfactory maximum temperature should be between 600 and 700°.

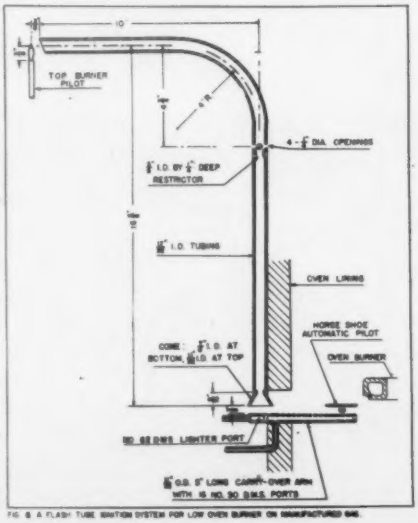

FIG. 6 A FLASH TUBE IGNITION SYSTEM FOR LOW OVEN BURNER ON MANUFACTURED GAS

Automatic Flash Tube Ignition of Ovens and Broilers

Within the last 2 years, intensive research has been devoted to automatic lighting of gas range burners by means of flash tubes. While such methods have long been widely used for top burner ignition, their application to ovens and broilers has been much more limited. In such instances, additional problems are introduced which data very recently developed have largely solved. These include such considerations as shape, diameter and length of flash tube from the oven to the constant burning pilot, size and position of relief openings, and use of tube restrictors, to mention only a few. Research has also indicated numerous ways in which existing applications of flash tube lighters to ovens could be materially improved. To verify experimental data, flash tubes with necessary accompanying accessories were installed on 3 domestic ranges incorporating various types of ovens and broilers. As the systems, as installed, presented essential points of difference, they will be discussed individually.

Figure 6 shows a flash tube ignition system as installed in a conventional range having a combined low oven and broiler, the oven top being flush with the cooking top. A 17/32 inch I.D. flash tube with a 90° bend and having an overall height of 16⅝ inches was employed. A 4 inch radius of curvature was used, this being the limit imposed by the construction of the range which necessitated use of a curved rather than a straight vertical tube. Presence of a ⅜ inch diameter restrictor immediately below the relief openings at the bottom of the curved portion will be noted as well as a cone restrictor at the tube bottom.

Turning on the oven burner cock admitted gas to the lighter port, sub-

burner and automatic pilot valve. Gas flows through the lighter port into the flash tube, ignition takes place from the top burner pilot and flame flashes to the lighter port and sub-burner which lights the automatic pilot. Following actuation of automatic pilot, the oven burner is ignited by its flame. This system gave very satisfactory ignition throughout, representing a distinct improvement over the flash tube lighting system originally furnished with the range.

automatic pilot. This system also provided rapid and consistent ignition.

These studies on automatic flash tube lighters as applied to ovens were conducted using manufactured gas. As natural gas was found to introduce additional problems, a supplementary investigation was devoted to their solution. Results are reported in a new research bulletin which will shortly be made available. Expressed

Figures 8 and 9 illustrate latest flash tube applications embodying latest data secured.

Full detail of the different studies which have been briefly discussed will be found in the various research bulletins already available to the industry or shortly to be issued. These contain a great amount of experimental data obtained in the conduct of a carefully planned and supervised program of fundamental research. They should be of material

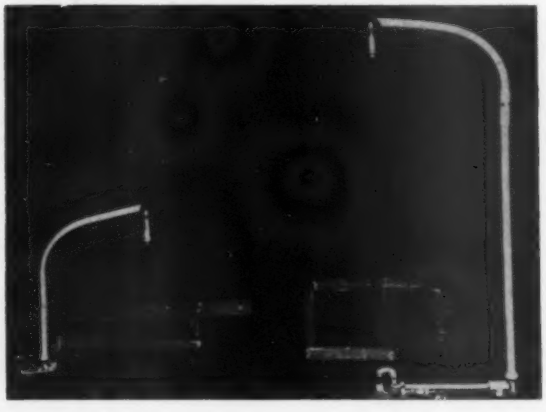

Fig. 7. Automatic Flash Tube Ignition System for Separate High Broiler (left) and Low Oven (right) Ranges for Manufactured Gases, Designed from Scientific Principles Revealed in This Research Project.

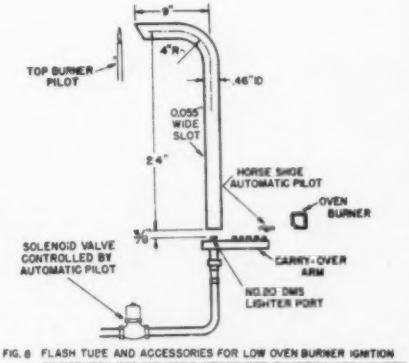

FIG. 8 FLASH TUBE AND ACCESSORIES FOR LOW OVEN BURNER IGNITION ON NATURAL GAS INCLUDING MEANS FOR SHUTTING OFF LIGHTER PORT FLAME AFTER OVEN BURNER IGNITION

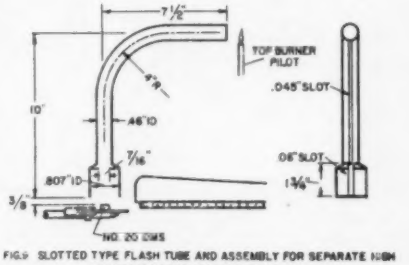

FIG. 9 SLOTTED TYPE FLASH TUBE AND ASSEMBLY FOR SEPARATE HIGH BROILER IGNITION ON NATURAL GAS

Figure 7 illustrates automatic flash tube applications to two remaining ranges. The one at the right represents mounting in a combined low oven and broiler located below the top compartment. A 25¼ inch overall length of 9/16 inch diameter flash tube was required, 4 inch radius of curvature being employed as in the case previously described. Restrictors and relief openings were the same in number, size and location as in the former instance. The same size of cone lighter port was also employed. Speed of ignition through the 25¼ inch tube was almost as rapid as in the shorter tube previously discussed. A slightly higher lighter port rating was required.

The illustration at the left of Figure 7 represents the system installed in a separate broiler directly under the top section. As the flash tube could be inserted through the top of the broiler compartment, a subburner was not necessary. A lighter port was drilled in the top of the pilot burner head and a fixed orifice used to regulate flow to the pilot and lighter port. Turning on the oven burner cock admits gas to the lighter port, pilot burner ports and automatic pilot valve. Any air-gas mixture from the pilot passing up the flash tube is ignited from the top burner pilot and flashes to the pilot burner. When the automatic pilot is actuated, gas is admitted to the broiler burner and lighted by the

briefly, refinements were developed which resulted in satisfactory performance with natural as well as manufactured gas. The most important detail related to the use of a continuous slot in curved vertical flash tubes to overcome concussion which took place on lighting, using natural gas. Such slotted tubes of small diameter were successfully applied to various types of ovens. In the case of low ovens requiring longer flash tubes, it was further necessary to provide means for shutting off the lighter ports after ignition when natural gas was used to avoid combustion difficulties with this gas. It was further found that flash tubes embodying these latest findings gave even better performance on manufactured gas than did those previously described.

assistance to those interested in taking full advantage of latest technical information in the design and construction of new types of gas ranges in order that they may meet the high standards of performance expected, if not actually demanded by the gas-consuming public.

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AMERICA'S SYMBOL OF CERTIFIED PERFORMANCE

RECENT COURT DECISIONS
Affecting Gas Utilities

The Hope Natural Gas Decision;—An Analysis

By
John Simpson

THE SUPREME COURT of the United States, January 3, 1944, reversed the judgment of the Fourth Circuit Court of Appeals (134 F, 2d 287) which set aside, one judge dissenting, a rate order issued by the Federal Power Commission reducing the rates chargeable by Hope Natural Gas Company (44 P.U.R. N.S. 1) as being invalid under the Natural Gas Act of 1938. The Supreme Court reviewed the cases involved, Federal Power Commission, City of Akron and Pennsylvania Public Utility Commission v. Hope Natural Gas Company and City of Cleveland v. Same, because of the public importance of the questions presented.

There were separate dissenting opinions by Justice Frankfurter and Justice Reed; a separate opinion by Justices Black and Murphy and another by Justice Jackson. Justice Roberts did not take part in the consideration of the case. The opinion of the court was delivered by Justice Douglas.

The Commission's Order

The Commission's investigation began in 1938. On May 26, 1942, it entered its order and made its findings, after hearings on the consolidated cases. This order required Hope to decrease its future interstate rates so as to reflect a reduction, on an annual basis, of not less than $3,609,857 in operating revenues. And it established "just and reasonable" average rates per m.c.f. for each of the five customer companies.

The Commission established an interstate rate base of $33,712,526, which, it found, represented the "actual legitimate cost" of the company's interstate property less depletion and depreciation and plus unoperated acreage, working capital and future net capital additions. It found the "actual legitimate cost" of the plant in interstate service to be $51,957,416, as of December 31, 1940. It deducted accrued depletion and depreciation, which it found to be $22,328,016 on an "economic service-life" basis, and it added $1,392,021 for future net capital additions, $566,105 for useful unoperated acreage and $2,125,000 for working capital. It used 1940 as a test year to estimate future revenues and expenses. It allowed over $16,000,000 as annual operating expenses, about $1,300,000 for taxes, $1,460,000 for depletion and depreciation, $600,000 for exploration and development costs, $8,500,000 for gas purchased. It allowed a net increase of $421,160 over 1940 operating expenses, to take care of future increase of wages, West Virginia property taxes and exploration and development costs. The total amount of deductions allowed from interstate revenues was $13,495,584.

The Commission refused to place any reliance on reproduction cost new, saying that it was "not predicated upon facts" and was "too conjectural and illusory to be given any weight in these proceedings." It likewise refused to give any "probative value" to trended "original cost" since it was "not founded in fact" but was "basically erroneous" and produced "irrational results." It concluded, by a majority, that where, as here, a business is brought under regulation for the first time and where incorrect depreciation and depletion practices have prevailed, the deduction of the reserve requirement (actual existing depreciation and depletion) rather than the excessive reserve should be made so as to lay "a sound basis for future regulation and control of rates."

Hope contended that it should be allowed a return of not less than 8%. The Commission found that an 8% return would be unreasonable but that 6½% was a fair rate of return. That rate of return applied to the rate base of $33,712,526, would produce $2,191,314 annually, as compared with the present income of not less than $5,810,171.

Circuit Court of Appeals' Reasons for Setting Order Aside

1. The Circuit Court of Appeals held that the rate base should reflect the "present fair value" of the property; that the Commission in determining the "value" should have considered reproduction cost and trended original cost, and that "actual legitimate cost" (prudent investment) was not the proper measure of "fair value" where price levels had changed since the investment.

2. It concluded that the well drilling costs and overhead items in the amount of some $17,000,000 should have been included in the rate base.

3. It held that accrued depletion and depreciation and the annual allowance for that expense should be computed on the basis of "present fair value" of the property, not on the basis of "actual legitimate cost."

The Circuit Court of Appeals also held that the Commission had no power to make findings as to past rates in aid of state regulation. But it concluded that those findings were proper as a step in the process of fixing future rates. Viewed in that light, however, the findings were deemed to be invalidated by the same errors which vitiated the findings on which the rate order was heard.

What the Natural Gas Act Prescribes

Section 4 (a) of the Natural Gas Act provides that all natural gas

rates subject to the Commission's jurisdiction" shall be just and reasonable and any such rate or charge that is not just and reasonable is hereby declared to be unlawful." Section 5 (a) gives the Commission the power, after hearing, to determine the "just and reasonable rate" to be thereafter observed and to fix the rate by order. That section also empowers the Commission to order a "decrease where existing rates are unjust unlawful, or are not the lowest reasonable rates." Section 19 (b) provides that on review of these rate orders the "finding of the Commission as to the facts, if supported by substantial evidence, shall be conclusive." Congress, however, the Supreme Court opinion adds, "has provided no formula by which the 'just and reasonable' rate is to be determined. It has not filled in the details of the general prescription of sections 4(a) and 5(a). It has not expressed in a specific rule the fixed principle of 'just and reasonable.'"

A note to the opinion here reads that Sec. 6 of the Act comes the closest to supplying any definite criteria for rate making. It provides in subsection (a) that "The Commission may investigate and ascertain the actual legitimate cost of the property of every natural gas company, the depreciation therein, and, when found necessary for ratemaking purposes, other facts which bear upon the determination of such cost or depreciation and the fair value of such property." Subsection (b) provides that every natural gas company on request shall file with the Commission a statement of the "original cost" of its property and shall keep the Commission informed regarding the "cost" of all additions, etc.

Supreme Court's Reasons for Sustaining the Order

After stating the essential facts substantially as above, the Court gives its reasons for revising the Circuit Court of Appeals and sustaining the Commission's order.

"Rate-making," the Supreme Court says," is indeed but one species of price fixing. Munn v. Illinois, 94 U. S. 113, 134. The fixing of prices, like other applications of the police power, may reduce the value of the property which is being regulated. But the fact that the value is reduced does not mean that the regulation is invalid. Block v. Hirsh, 256 U.S. 135, 155, 157; Nebbia v. New York, 291 U.S. 502, 533-539 and cases cited. It does, however, indicate that 'fair value' is the end product of the process of ratemaking not the starting point as the Circuit Court of Appeals held. The heart of the matter is that rates cannot be made to depend upon 'fair value' when the value of the going enterprise depends on earnings under whatever rates may be anticipated.

"We held in Federal Power Commission v. Natural Gas Pipeline Co. (315 U.S. 575) that the Commission was not bound to the use of any single formula or combination of formulae in determining rates. Its rate-making function, moreover, involves the making of "pragmatic adjustments' Id. p. 586. And when the Commission's order is challenged in the courts, the question is whether that order 'viewed in its entirety' meets the requirements of the Act. Id. p. 585. Under the statutory standard of 'just and reasonable' it is the result reached not the method employed which is controlling (citations omitted). It is not theory but the impact of the rate order which counts. If the total effect of the rate order cannot be said to be unjust and unreasonable, judicial inquiry under the Act is at an end. The fact that the method employed to reach that result may contain infirmities is not then important. Moreover, the Commission's order does not become suspect by reason of the fact that it is challenged. It is the product of expert judgment which carries a presumption of validity. And he who would upset the rate order under the Act carries the heavy burden of making a convincing showing that it is invalid because it is unjust and unreasonable in its consequences.

"The rate-making process under the Act, i.e., the fixing of 'just and reasonable' rates, involves a balancing of the investor and the consumer interests. Thus we stated in the Natural Gas Pipeline Co. case that 'regulation does not insure that the business shall produce net revenues.' 315 U.S. p.590. But such considerations aside, the investor interest has a legitimate concern with the financial integrity of the company whose rates are being regulated. From the investor or company point of view it is important that there be enough revenue not only for operating expenses but also for the capital costs of the business. These include service on the debt and dividends on the stock. By that standard the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to inspire confidence in the financial integrity of the enterprise, so as to maintain its credit and to attract capital. The conditions under which more or less might be allowed are not important here. Nor is it important in this case to determine the various permissible ways in which any rate base on which the return is computed might be arrived at. For we are of the view that the end result in this case canot be condemned under the Act as unjust and unreasonable from the investor or company viewpoint."

Hope is an entirely stock company, wholly owned by Standard Oil since 1908. It has no securities outstanding except stock. The par amount presently outstanding is about $28,000,000. The Commission established a rate base of $33,712,526. Of the outstanding stock $11,000 was issued as stock dividends. The balance, about $17,000,000, was issued for cash or other assets. Hope has paid over $97,000,000 in cash dividends in the 40 years since it began operating. By 1940 it had an earned surplus of $8,000,000. It had thus earned the total investment of the company nearly seven times. Down to 1940 it earned over 20% per year on the average annual amount of the capital stock issued for cash or other assets. "On an average invested capital of some $23,000,000 Hope's average earnings have been about 12% a year. And during this period it had accumulated in addition reserves for depletion and depreciation of about $46,000,000. Furthermore, during 1939, 1940 and 1941, Hope paid dividends of 10% on its stock. And in the year 1942, during about half of which the lower rates were in effect, it paid dividends of 7½%. From 1939-1942 the earned surplus increased from $5,250,000 to about $13,700,000 i.e. to almost half the par value of its outstanding stock."

The Commission, the Court repeated, fixed a rate of return permitting Hope to earn $2,191,314 annually, stressing the importance of maintaining the financial integrity of the company. It concluded its rate order, "The company's efficient management, established markets, financial record, affiliations, and its prospective business, place it in a strong position to attract capital upon favorable terms when it is required."

In view of these considerations the Supreme Court could not say that an annual return of $2,191,314 is not "just and reasonable" within the meaning of the Natural Gas Act, even though it might be only a

meager return upon the so-called "fair value" rate base. Hope had contended for a rate base of $66,000,000 computed on reproduction cost new. The Commission pointed out that would give Hope an average rate of return for the four year period from 1937-1940 of 3.27%. The Supreme Court said: "During this period Hope earned an average annual return of about 9% on the average investment. It asked for no rate increases. Its properties were well maintained and operated. As the Commission says, such a modest rate of 3.27% suggests 'an inflation of the base on which the rate has been computed.' The inequity between the actual operations and the return computed on the basis of reproduction cost suggests that the Commission was wholly justified in rejecting the latter as the measure of the rate base.

"In view of the disposition of the controversy we need not stop to inquire whether the failure of the Commission to add the $17,000,000 of well drilling and other costs to the rate base was consistent with the prudent investment theory as developed and applied in particular cases."

The Dissenting Opinions

Justice Jackson in his dissenting opinion said that the theory of the Circuit Court of Appeals that this rate-making to the fair value reproduction cost formula certainly should be overruled as in conflict with Federal Power Commission v. Natural Gas Pipeline Co. 315 U.S. 575. But he thought our rate-making doctrine as applied should be reconsidered and that the case should be returned to the Commission for further consideration.

The Commission, Justice Jackson said, appears to have understood the effect of the two opinions in the Pipeline case, "to be at least authority and perhaps direction to fix natural gas rates by exclusive application of the 'prudent investment' rate base theory. This has no warrant in the opinion of the Chief Justice of the Court, however, which releases the Commission from subservience to "any single formula or combination of formulas," provided its order, "viewed in its entirety, produces no arbitrary result." (315 U.S. 586). The majority opinion I understood to advocate the 'prudent investment' theory as a sufficient guide in a natural gas case. The view was expressed in the court below that since this opinion was not expressly controverted it must have been approved. I disclaim this imputed approval with some particularity because I attach importance at the very beginning of federal regulation of the gas industry to approaching it as the performance of economic functions, not as the performance of legalistic rituals."

Justice Jackson went to say that the peculiarities or "eccentricities" of the natural gas industry and also the governing act, the Natural Gas Act, must be considered in solving these cases, and that "the heart of the problem is the elusive, exhaustible and irreplaceable nature of natural gas itself." This feature of the problem as applied particularly to the Hope company Justice Jackson developed.

"If we assume that the reduction in company revenues is warranted" the dissenting opinion said, "we then come to the question of translating the allowed return into rates for consumers or classes of consumers. Here the Commission fixed a single rate for all gas delivered irrespective of its use despite the fact that Hope has established what amounts to two rates—a high one for domestic use and a lower one for industrial contracts. The Commission can fix two prices for interstate gas as readily as one—a price for resale to domestic users and another for resale to industrial users. This is the pattern Hope itself has established in the very contracts over which the Commission is expressly given jurisdiction. Certainly the Act is broad enough to permit two prices to be fixed instead of one, if the concept of the 'public interest' is not unduly narrowed."

Limitation of supply, Justice Jackson said, brings into a natural gas case another phase of the public interest besides the Commission's concept first announced in the minority opinion in the Pipeline case, which enumerated only two phases (1) the investor interest (2) the consumer interest, which it emphasized to the exclusion of all others, 315 U.S. 606.

Justice Jackson concluded his dissenting opinion by saying that the Commission "is entitled to its own notion of the 'public interest' and its policy must prevail. However, where there is ground for thinking that views of this Court may have constrained the Commission to accept the rate base method of decision and a particular single formula as 'all-important' for a rate base, it is appropriate to make clear the reason why I, at least, would not be so understood. The Commission is free

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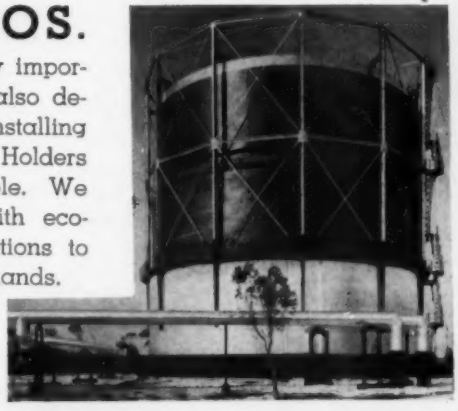

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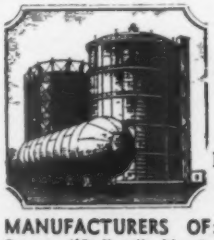

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to face up realistically to the nature and peculiarity of the resources in its control, to foster their duration in fixing price, and to consider future interests in addition to those of investors and present consumers."

Justice Frankfurter's dissenting opinion was intended solely to emphasize his basic agreement with that of Justice Jackson. It concludes:

Congress "has committed to the administration of the Federal Power Commission the duty of applying standards of fair dealing and of reasonableness relevant to the purposes expressed by the Natural Gas Act. The requirement that rates must be just and reasonable means just and reasonable in relation to appropriate standards. Otherwise Congress would have directed the Commission to fix such rates as in the judgment of the Commission are just and reasonable, it would not have also provided that such determinations by the Commission are subject to court review.

"To what sources then are the Commission and the courts to go for ascertaining the standards relevant to the regulation of natural gas rates? It is at this point that Mr. Justice Jackson's analysis seems to me pertinent. There appear to be two alternatives. Either the fixing of natural gas rates must be left to the unguided discretion of the Commission so long as the rates it fixes do not reveal a glaringly bad prophecy of the ability of a regulated utility to continue its service in the future. Or the Commission's rate orders must be founded on due consideration of all the elements of the public interest which the production and distribution of natural gas involve, just because it is natural gas. These elements are reflected in the Natural Gas Act, if that Act be applied as an entirety. See, for instance, §§ 4(a) (b) (c) (d), 6 and 11, 15 U.S.C. §717 c (a) (b) (c) (d) 717 e and 717 j. Of course, the statute is not concerned with contract theories of rate-making. But its very foundation is the 'public interest' and the public interest is a feature of multiple strands. It included more than contemporary investors and contemporary consumers. The needs to be served are not restricted to immediacy, and social as well as economic costs must be counted.

"It will not do to say that it must all be left to the skill of experts. Expertise is a rational process, and a rational process implies articulation of reasons for judgment. It will little advance the public interest to substitute for the hodge podge of the rule in Smyth v. Ames, 169 U.S. 466, an encouragement of conscious obscurity or confusion in reaching a result, on the assumption that so long as the result appears harmless its basis is irrelevant. That may be an appropriate attitude when state action is challenged as unconstitutional. Cf. Driscoll v. Edison Co., 307 U.S. 104. But it is not to be assumed that it was the design of Congress to make accommodation of the conflicting interests exposed in Mr. Jackson's opinion the occasion for a blind clash of forces or a partial assessment of relevant factors, either before the Commission or here.

"The objection to the Commission's action is not that the rates it granted were too low but that the range of vision was too narrow. And since the issues before the Commission involved no less than the total public interest, the proceedings before it should not be judged by narrow conceptions of common law pleadings. And so I conclude that the case should be returned to the Commission. In order to enable this Court to discharge its duty of reviewing the Commission's order, the Commission should set forth with explicitness the criteria by which it is guided in determining that rates are 'just and reasonable' and it should determine the public interest that is in its keeping in the perspective of the considerations set forth by Mr. Justice Jackson."

Justice Reed's dissenting opinion pointed out that a Commission's powers in fixing utility rates are limited not only by the constitutional standards of due process and for taking private property for public use without just compensation, but also by the delegation from Congress. "Here the standard added by the Natural Gas Act is that the rate be 'just and reasonable.' Section 6 throws additional light on the meaning of these words."

"I agree with the Court in not imposing a rule of prudent investment alone in determining the rate base. This leaves the Commission free, as I understand it, to use any available evidence for its finding a fair value, including both prudent investment and the cost of installing at the present time an efficient system for providing the needed utility service."

But the major error Justice Reed found was the disregard by the Commission of the investment in exploratory operations and other recognized capital costs. These were not considered by the Commission because they were charged to operating expenses by the company at a time when it was unregulated.

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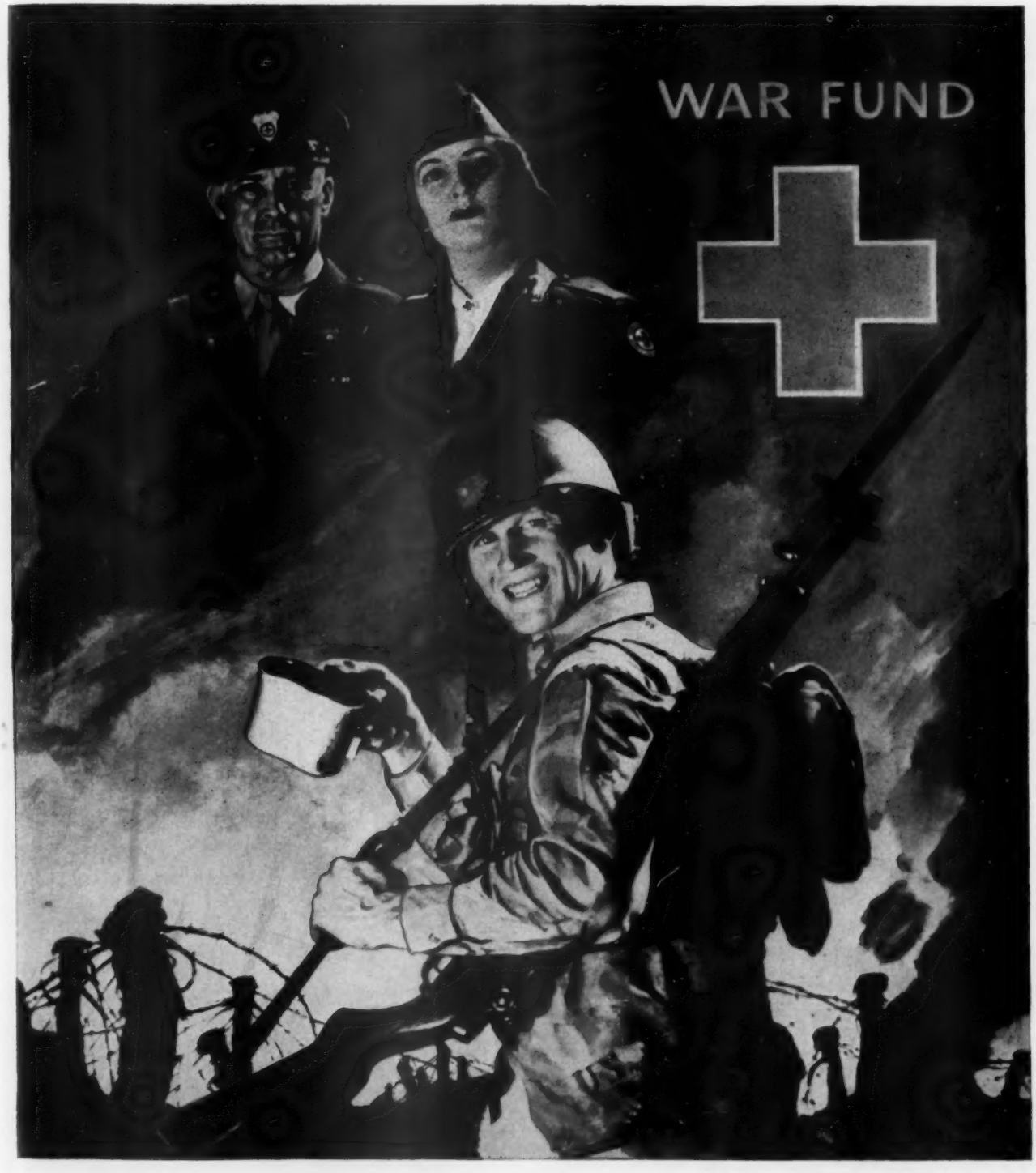

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Radiant Heat Serves The World's Largest Airships

By
F. K. Whiteside
Engineer of Industrial Gas Utilization
The Brooklyn Union Gas Company
Brooklyn, N. Y.

AN UNUSUALLY clear example of the speed and efficiency of radiant heating is furnished by the large gas-fired salt bath aluminum heat treating furnace in the new shops of Pan American World Airways at La Guardia Field, New York's Municipal Airport. Here the famous Clippers and other large flying boats are thoroughly gone over and repaired between their trans-Atlantic flights. Realizing the advantage of being able to anneal and harden the aluminum alloy parts used in the repair work with minimum delay, Pan American incorporated in the plans for its new shops a salt bath heat treating furnace capable of handling sheets up to 14 feet long and 4 feet wide. As all the equipment installed in these new shops is of the most modern type, it was only natural that the finest in heat treating furnace should be selected. After giving due consideration to the merits and costs of various furnace designs and heating media, Pan American decided upon a gas-fired unit equipped with radiant burners. Cost studies indicated that gas fuel offered the greatest economies, both in operation and maintenance. It had the additional advantage of being ideally suited to automatic operation and temperature control. The intermittency of its use was also a factor governing the fuel choice. While pot furnaces of this same general size, shape and purpose are now in existence, both gas-fired and electrically heated, it is believed that none other embodies this particular advanced method of gas heat application.

The pot containing the salt bath is 14'0" long, 2'6" wide, and 5'0" deep on the inside. It is constructed of 1¼" firebox steel with double welded seams. Around the top of the pot is welded a 7 inch structural steel channel with the flanges turned downward. The outer flange of this channel fits into a sand seal at the top of the furnace setting. The pot weighs approximately 5,500 pounds and holds, when full, ten tons of salts. A mixture of sodium and potassium nitrates, with a melting point of 425°F., is used.

The operating temperature ranges between 650°F. for annealing, and 920°F. for solution heat treating.

Fast and Uniform Heating

As the furnace is used intermittently as the need arises, the time required for heating up is of considerable importance. This requirement was one of the principal factors which brought about the selection of radiant burners. Another determining factor was the necessity of obtaining absolute uniformity of heating. To satisfy these requirements, heating by a multiplicity of radiant burners was decided upon. Since 70 percent of the area of the pot surface is in the two sides, and since the width is quite small as compared with the length and height, only the sides are used for direct heat absorption from the radiant burners.

Type of Burners

The burners which were selected for this application are the all-ceramic Duradiant burners manufactured by the Selas Company of Philadelphia. A view of one of these burners is shown in Figure 1. Gas and air in proper proportions for perfect combustion issue from the burner tip in a large number of small streams tangent to the burner cup. The design of the cup is such that the products of combustion swirl back toward the burner tip in sort of an involute curve. They therefore do not issue from the burner at a high velocity or in a direct straight line. Because of this characteristic, it was possible to place the faces of the burners no further than eight inches from the pot without danger of flame impingement and hot spots. The surface of the burner cup is corrugated, and the resulting turbulence causes instant ignition and holding on of the flame to the burner tip. The combustion products soon raise the burner cup to incandescence and provide the radiant heat from which the burner obtains its name.

With this particular relation between burners and object being heated, there exists an ideal condition for heat transfer. The pot wall for all practical purposes is a black body and absorbs most of the radiant heat directed toward it. The heating source is at a relatively high temperature and is located very close to

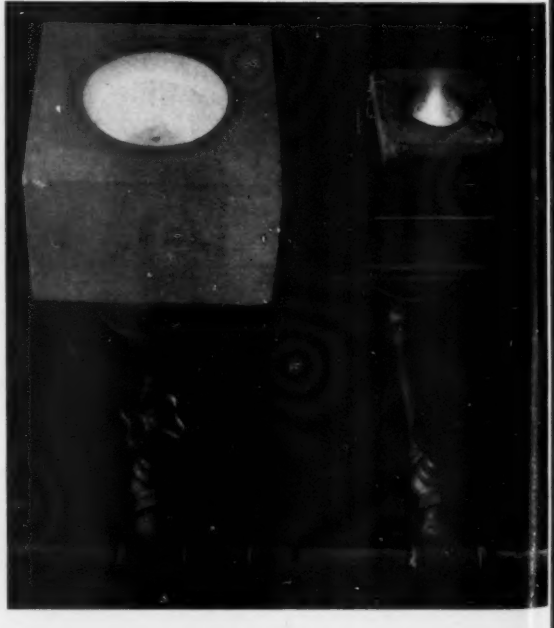


Figure 1. Typical ceramic-cup radiant gas burner (left) shown during throttled operation, — as compared to typical conventional single-port burner (right) operating at the same input, air-gas ratio, etc. Note the uniformity of incandescence in cup, and absence of flame beyond burner face.

the object being heated. It was found that when heating the furnace up from a cold start to 920°F., 70 percent of the B.T.U.'s were effectively utilized in heating the pot and the salts. It was interesting to discover how little heat was absorbed by the furnace setting during the heating-up period. By subtracting the calculated heat in the flue gases from the remaining 30 percent, it was found that only 4 percent was unaccounted for. The greater part of this 4 per cent was absorbed by the furnace walls and piers. Only a small portion was lost by radiation from the furnace.

Insulating Firebrick Linings

For purposes of stability, the furnace side walls are constructed of 9 inches of insulating firebrick with no additional insulation. In order to contain the flues, the end walls are of insulating firebrick 13½ inches thick. The bottom is constructed of 5 inches of insulating firebrick backed up by 1½ inches of block insulation. During operation, because of the radiance from the burners, the furnace walls appear also to be incandescent, but shortly after the burners are shut off, it is apparent that what appeared to be heat in the walls was only a reflection from the pot. When designing the furnace, one of the chief causes of concern was that the salt might not be able to absorb the heat as fast as it was generated. This fear was later found to be groundless. At no time during the heating up period do the pot sides become overheated. If when the salt bath is approaching a temperature of 920°F., the burners are shut off, only by the closest scrutiny can any color be detected either in the furnace or pot walls.

So complete is the absorption of heat by the salt that while heating up the products of combustion leave the furnace at a temperature not exceeding 100 degrees higher than that of the salt. Before leaving the furnace, the flue gases are required to travel to the bottom of the setting and thence underneath the pot to the flue openings in the end walls. The furnace therefore operates under considerable pressure; hence the need for the sand seal at the top. When at operating temperature the ends of the pot fit snugly against the end walls of the furnace, thereby preventing the products of combustion from short circuiting. The pot actually expands one inch in length and about 1/3 inch in height when heated.

Location of Burners

In order to obtain uniform distribution of heat, 44 Selas Duradiant burners are used, half of these being on each side of the furnace. The burners are placed in three horizontal rows spaced 15 inches apart vertically. There are eight burners in the top and center rows and six in the bottom row on each side. The burners are manifolded in eight groups of four and four groups of three, making twelve groups in all. Each group is supplied with its properly proportioned mixture of air and gas by a Selas low pressure Proportional Mixer and individual zero regulator on the gas line. Air is supplied by a Spencer Turbo Compressor operating at 24 ounces pressure. The gas used is a mixture of coke oven and carbureted water gas having an average heating value of 540 B.T.U. per cubic foot and a specific gravity of 0.60.

The furnace has an hourly gas demand of 4500 cubic feet and at this rate of consumption can be heated from cold to 920°F. in slightly less than 5 hours.

Temperature Control

For purposes of automatic temperature control, the furnace is divided into two zones, each independent of the other. The air supply to each zone is controlled by a three-position motor operated valve actuated by a Wheelco Capacitrol. While heating up, the air valve is in the wide open position. As the required temperature is approached, the valve closes part way. When the control temperature is reached the valve closes to a minimum setting which is just sufficient to keep the burners in operation. North American adjustable port valves are used. They are set to give a pressure drop of 4 ounces. By actually sizing the valve to the demand in this manner, the flow through the valve in its various positions can be accurately controlled.

With an enormous storage of heat in the molten salt, and with a well insulated setting, it can readily be imagined that one of the main difficulties of operation is to keep the temperature from rising if the burners remain on with no work being heated in the furnace. It has been found that the salt bath temperature can be automatically controlled within plus or minus 5°F. by operating on the lowest twelve burners. A fair idea of the magnitude of heat storage may be obtained when it is realized that it takes seven days for the salt temperature to drop 700 degrees. The latent heat of fusion of this mass of salt is equal to the amount of heat generated by burning approximately 2000 cubic feet of gas. This heat, of course, is released when the salt solidifies.

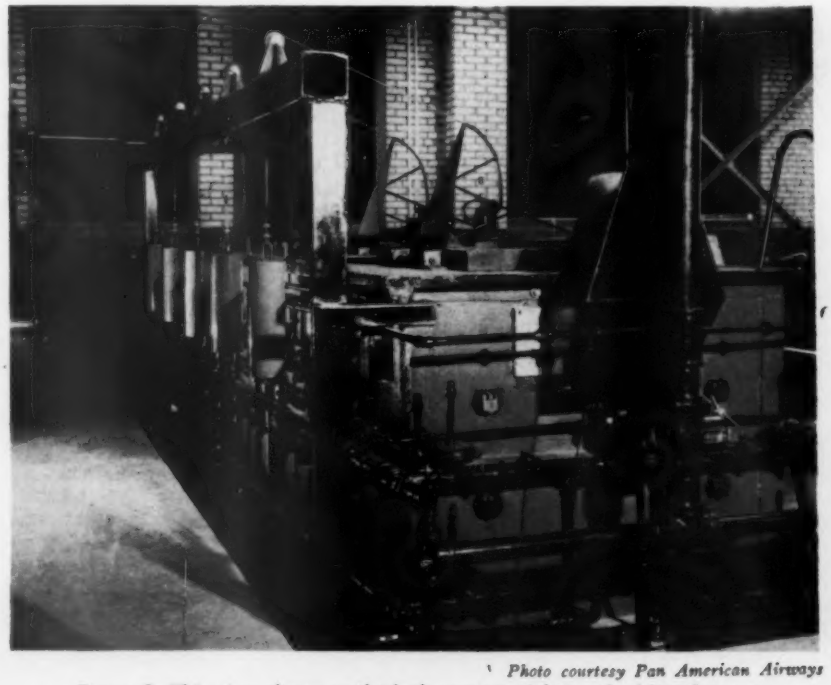


Photo courtesy Pan American Airways

Figure 2. This view shows method of counterweighting the hinged covers.

Ignition

The initial lighting of a furnace of this size with completely enclosed setting and with a large number of burners presented a problem, especially since one end of the furnace is only four feet from an exterior building wall. This precluded the use of a long torch inserted from the end of the furnace. A satisfactory piloting system was worked out by applying small sealed-in pilot burners to the sixteen Duradiant burners at the uppermost level. These pilot burners are manifolded in groups of four and are of the premix type, using air at approximately 8 ounces pressure. They fire into specially constructed burner tunnels which line up with the lighting holes in the burner blocks. To obtain the proper alignment of the pilot burners, to ram the tunnels and to center the pilot burner supporting brackets, a single mandrel was developed. Although experiments had indicated that these pilots would ignite the Duradiant burners without any delay, extra precautions were taken. Small baffles made of ⅛" x ¾" Inconel strip were placed about one inch in front of the face of the lighting holes so that the pilot flames are deflected downward in front of the burner cups. Ignition therefore takes place instantly. When the top row burners are lighted, the pilots are turned off. The burners in the middle and lower rows are then ignited from the burners above.

Design Details

In a repair shop such as that of Pan American World Airways, considerable flexibility of equipment is desirable. With this in mind the furnace is provided with five individually hinged and counterweighted covers. A working opening varying between 3 feet and 14 feet in length can be made available. These covers are constructed of 3 inch channel iron and are lined with cast insulating concrete reinforced and securely anchored in place. On the under surface of the cover, the insulating material is directly exposed to the heat. There is no steel plate there to warp and get out of shape.

Figure No. 2 shows the method of counterweighting. The purpose of the odd shaped framework on top of each cover is to balance the cover in all positions. This is effected by constantly changing the lever arm through which the lifting cable acts. Therefore with a constant pull provided by the counterweight, the effective moment decreases as the cover raises. When the cover is in the vertical position the direction of the cable, if extended, will pass through the hinge, with a resulting moment of zero.

Photo courtesy Pan American Airways

Fig. 3. Front of furnace shows burners, proportional mixers and hinged covers. Note pilots on uppermost burners.

Pressure Control and Furnace Setting

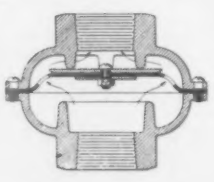
As a safety feature, the gas supply to each half of the furnace passes through an Eclipse Dual-Lock valve which automatically closes upon the failure of either the gas or air pressure. When once closed, this valve must be opened manually before gas again becomes available at the burners.

It will be observed in Figure 3 that the furnace is set in a pit. This pit is 30 inches deep. For convenience of operation, the furnace would have been sunk deeper were it not for the fact that the ground water level is exceedingly high at this location. Although the foundation pit was waterproofed, it was not considered advisable to risk serious damage to the furnace should ground water seep into the pit.

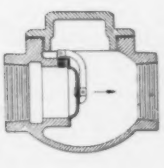
All materials for the installation were supplied by Pan American World Airways who also performed all the labor on the job with the single exception of the installation of the pot. This was done by a firm of professional riggers.

The furnace embodies one of the most recent developments in gas combustion equipment and has clearly demonstrated to Pan American the advantages claimed for radiant heating. They in turn have expressed their satisfaction with the installation, which promises to earn a good return on the capital invested in it. For every day that one of the huge Clippers is laid up for repairs, a loss of operating revenue results. By speeding up repairs, the furnace does its bit toward keeping the ships in the air.

Prompt Deliveries From Our Own Factory



HORIZONTAL
DIAPHRAGM
CHECK VALVES
DISC
VERTICAL



NORWALK VALVE COMPANY
85 Spring St. South Norwalk, Conn.

All sizes up to 3,400 cu. ft. capacity

Meters
Diaphragms
Repairs
Provers
Pumps
Calorimeters
Wet Meters
Gauges
Apparatus

METER REPAIR PARTS

FOR
ALL MAKES — ALL SIZES OF METERS

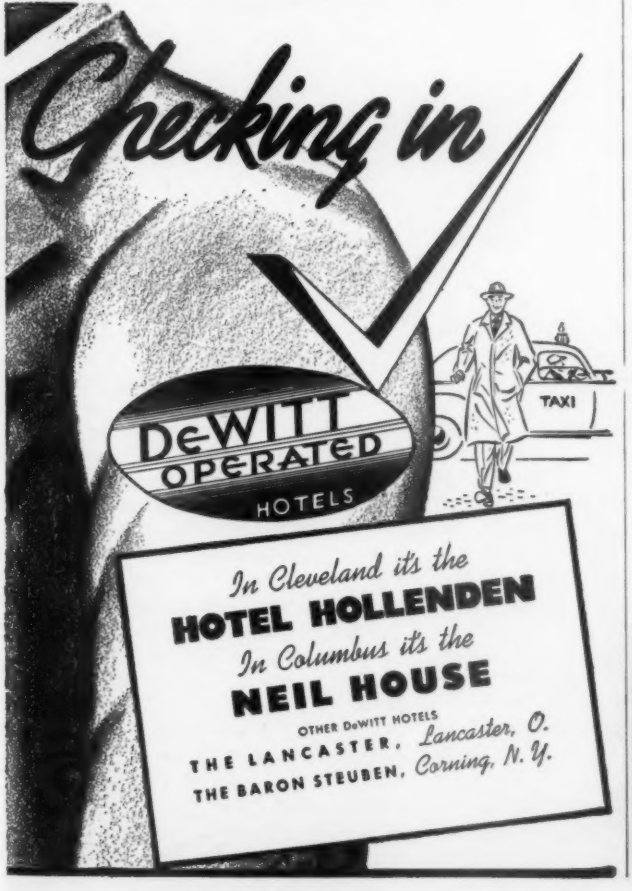
LARGEST GAS COMPANIES NOW USING OUR PARTS

SEND FOR OUR CIRCULAR ON METER REPAIR PARTS

SAMPLES AND PRICES GLADLY SENT

— o —

LAMBERT METER CO.
PLAINFIELD, NEW JERSEY



Reliable

Today—more than ever—you need—and are entitled to good Reliable Service from your Gas Control equipment. REYNOLDS Regulators give you good service today just as they have for more than half a century.

Reliable, efficient service is a Reynolds tradition. Regardless of heavy war demands, which have priority in capital letters, we are making every effort to maintain the tradition of good, reliable service.

Today—the Victory Program is the most important job for all of us. Gas Control Requirements of Reynolds' customers are being met in a manner that will definitely help in this time of National Emergency. Reynolds Engineering Service is yours for the asking in helping to solve your Gas Control Problems.

Reynolds Branch Offices . . .

423 Dwight Building
Kansas City, Missouri

2nd Unit,
Santa Fe Building
Dallas, Texas

Reynolds Representatives . . .

Eastern Appliance Company
Boston, Massachusetts

Wm. A. Ehlers
No. 268 Park Street
Upper Montclair, N. J.

REYNOLDS GAS REGULATOR CO.
Anderson, Indiana, U. S. A.
GAS CONTROL SINCE 1892

American Gas Association Activities

Domestic Gas Research is Featured Topic at A. G. A. Conference

Technological progress in the important field of domestic gas research was made the subject of a two-day conference held in Cleveland, Ohio, February 17 and 18, and attended by engineers, designers and other technicians of gas appliance and related equipment manufacturing companies as well as executives of gas companies and appliance companies.

Primary purpose of the conference, officially termed the American Gas Association Technical Conference on Domestic Gas Research, was to acquaint engineers and members of the technical staffs of appliance manufacturing organizations with the technical aspects of the fundamental research sponsored by the Association's Committee on Domestic Gas Research and with the most advanced thought in this field. Everett J. Boothby, vice-president and general manager, Washington Gas Light Company, is chairman of this committee, F. M. Banks, vice-president, Southern California Gas Co., is vice-chairman, and Eugene D. Milener, Secretary.

In his opening statement, Eugene D. Milener, Conference Manager, stated:

"This is the first time the gas industry has held a general conference devoted exclusively to technical research. Consequently, we will be pioneering during the two days we are here. We will, in fact, be pioneering not only for two days, but also in two ways.

"First, we will pioneer by discussing freely in open meeting the basic, fundamental, advanced technical facts and thinking that affect our domestic gas utilization, particularly as developed by the research staff of the A.G.A. Laboratories, under the supervision of the Committee on Domestic Gas Research. This Committee is composed of natural and manufactured gas executives and executives of appliance companies, and it is fortunate to have the guidance of Technical Advisory Subcommittees made up of leading manufacturer and utility technicians.

"Second, we will pioneer, in the Panel Sessions, by attempting to develop the best ways of translating fundamental research into practical results. This will be done by having as direct and frank exchange as possible, when considering trade relations of the manufacturers present.

"I believe this Conference offers an opportunity for everyone here to absorb new technical ideas and facts. I believe it will stimulate engineers and others to go home better able to appraise properly the true technical utilization problems that face us. On our ability to solve these technical problems depends, absolutely, the advance or stagnation of future gas appliances in the home.

"The presentation of papers, and the scheduling of discussion on each, have been carefully time-logged. You will notice at the top of the program that the Conference will be *restricted* to *technical* subjects pertaining to domestic gas research. The men who will preside at the several sessions will conduct the meeting accordingly. I am sure full cooperation will be extended by everyone present. Your company has sent you here at the request of the American Gas Association. I feel sure your company will expect you to arrive promptly at each meeting and remain until it closes. No evening meetings are scheduled, but you will find you will get a lot out of becoming acquainted with the other fellow—ask him some questions—answer his. Study the exhibit carefully.

"There is one group for whom this conference is particularly designed. That group includes engineers and designers of gas appliance manufacturing companies, so many of whom are present. It is you gentlemen that the authors of papers had primarily in mind. It is you gentlemen that we hope will get the most out of the discussions. And it is you gentlemen who will be given the right of way when you ask technical questions. Perhaps we are selfish in that respect; but to paraphrase Buick's famous slogan: 'When new and better gas appliances are designed, you will design them'."

Mr. Boothby introduced the first speaker at the morning session. John J. Quinn, general sales manager, Boston Consolidated Gas Co. took over the meeting later, having been delayed several hours in getting to Cleveland. Thereafter technical papers covering the technique of advancing atmospheric gas burner design and noise and heat transfer factors in the design of gas heating appliances were presented by F. E. Vandaveer, K. H. Flint and W. R. Teller of the A.G.A. Laboratories.

Display of fundamental domestic gas research at A.G.A. Technical Conference on Domestic Gas Research. Left to right: F. E. Vandaveer, A.G.A. Laboratories; H. W. Geyer, Southern Counties Gas Co., Los Angeles; Everett Boothby, Chairman, Comm. on Domestic Gas Research, Washington Gas Light Co., Washington, D. C.; Harry L. Warren, Southern California Gas Co., Los Angeles.

Everett J. Boothby, chairman of the A.G.A. Committee on Domestic Gas Research, presided at the first luncheon at which Frank H. Adams, general manager, Surface Combustion, Toledo, was the principal speaker. Mr. Boothby described the objectives of his committee and gave a brief history of its background. He said the results of the research work accomplished to date speak for themselves. The purpose of the conference, he declared, was summed up very well by a prominent gas range manufacturer who said, "I hope the conference will bring about an exchange of views among the engineers who will be present. The book of knowledge concerning the fundamentals of gas utilization is all too thin." Mr. Boothby declared that the information brought out dur-

ing the conference would in no way encroach upon the patents held by manufacturers. "If any manufacturer feels we have gone off the reservation I wish he would tell me," he said.

Talking to a luncheon audience that numbered almost 300 individuals, Mr. Adams said it was extremely important for everyone to know the policy of the gas industry in reference to research—how much of it is being done and whether or not it matches the research programs of competing industries. He said the American Gas Association is now appropriating some 40% of its income for research of various types.

"The principal objective of this domestic gas research program," Mr. Adams declared, "is to better gas appliances. In carrying out the objectives we face a double challenge. First, we must make sure the work is technically sound and, it must not only be usable but it must be used. The gas companies must support this program and take such action as will make it thoroughly effective."

Mr. Adams cited four fundamentals that should be considered in a long-term consideration of gas appliance research, as follows:

1. **Gas cannot be sold except through appliances. These determine type and quality of service.**
2. **Utilities have the greatest stake in research, because of their huge investment.**
3. **Utilities need a sound, loyal appliance manufacturing industry. There are too many appliances built by companies as a sideline—too many complaints as a result of poor appliances.**
4. **Development of appliances can best be done by manufacturers.**

In closing his address, Mr. Adams made a plea that gas companies should support the appliance manufacturers who do research work. Top management, he said, needs to be sold on this. He stated further that the volume of sales of gas appliances is much too low for a healthy appliance industry and declared that both the appliance manufacturers and the utilities should be concerned about this situation.

In answering the question, "What is the best policy to pursue in research," Mr. Adams said, "It is not a question of fundamental or applied research, but a matter of stimulating all manner of research throughout the gas industry and bringing forth, as a result, values measured in tangible form."

H. W. Geyer, utilization engineer of the Southern Counties Gas Co., Los Angeles, and a member of the Technical Advisory Subcommittee for Gas Water Heating Research, presided at the second day's morning session at which additional papers covering design and performance features of post-war gas burners and fundamental gas water heating research were presented by Leon Ourusoff, member of the Technical Advisory Subcommittee for Gas Cooking Research, and W. R. Teller and F. R. Wright of the A.G.A. Testing Laboratories. Speakers at the luncheon the same day were: Lyle C. Harvey, vice-president, Association of Gas Appliance & Equipment Manufacturers, who presented a message from this organization, and R. M. Conner, Director of the A.G.A. Laboratories.

Following the luncheon three panel sessions were conducted by the three Technical Advisory Subcommittees on gas cooking, gas water heating and central gas space heating. Problems involved in translating and applying fundamental research data to help in producing better gas appliances were discussed.

A valuable attraction at the conference was an operating exhibit at the Hotel Statler staged by the A.G.A. Laboratories. The exhibit featured new ideas in gas burners and burner performance, aeration, ignition, venting, control, heat distribution, etc.

A. G. A. Executive Board Approves Plans for Setting Up Natural Gas Department and Manufactured Gas Department

Putting into effect the organizational changes in the American Gas Association recently voted by the Association's membership, the Executive Board at a meeting in Cleveland, February 16, approved detailed plans for setting up a Natural Gas Department and a Manufactured Gas Department. These plans call for extensive changes in the Association's structure and for reorganization of various committees. Their purpose is to increase the usefulness of the Association to all its members and enlarge its opportunity to be of service to the industry.

As now constituted, the Constitution provides for a Natural Gas Department and a Manufactured Gas Department, each with a vice-president of the Association as chairman. The vice-presidents will serve as ex-officio members of the Finance and Control Committee. J. French Robinson, vice-president of the Association and president of The East Ohio Gas Company, is chairman of the new Natural Gas Department which succeeds the Natural Gas Section of which R. E. Wertz, president, Amarillo Gas Company, was chairman. George S. Hawley, president, The Bridgeport Gas Light Company, and past president of the Association, is chairman of the Manufactured Gas Department.

Natural Gas Department

In accordance with the plan approved by the Executive Board, the Natural Gas Department will be headed by a Managing Committee with Mr. Robinson, in his capacity of vice-president and chairman of the Department, acting as chairman. There will also be an Advisory Committee, a Nominating Committee and a director of the Department. The director of the Department will be a full-time employee of the Association and will have the additional post of assistant managing director.

Five main departmental committees have been established as follows: (1) Production and Storage, (2) Transmission, (3) Accounting, (4) Large Volume Sales, and (5) Technical and Research.

The Production and Storage Committee will handle matters relating to the producing of gas from wells, its storage and all related problems. It replaces the former "Production Committee" and recognizes the increasing importance and development of underground storage of natural gas.

Transportation of large volumes of natural gas from regions of abundant supply to markets often far removed, resulting in the construction of large diameter steel pipe lines operating at high pressure, makes the work of the Transmission Committee of far-reaching importance. The design, construction and operation of such lines call for an engineering knowledge of materials and methods of the highest order. The subcommittees listed on the accompanying chart are indicative of the component

(Continued on page 50)

New Equipment and Appliances

American Stove Resumes Range Production At One Plant

American Stove Company announces that on February 1st, production of gas ranges was resumed at its Harvey, Illinois, plant. This plant will manufacture the new model range permitted by O.P.A.

American Stove Model 7701-30

This model, 7701-30, will be a practical range from the cooking efficiency standpoint. Most of the Magic Chef pre-war features will be built into it, including the Red Wheel Regulator, automatic top lighter, 16" oven, full insulation, 3-in-1 Magic Chef top burners and porcelain enamel finish.

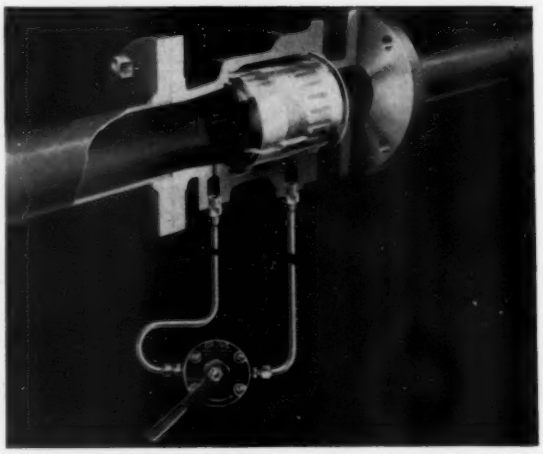
The stove will have standard size oven, broiler and cooking top facilities.

Remote Control Valve

The Grove Flexflo Remote Control Valve represents a distinct and radical departure from conventional types of valves in design, construction and operation. In contrast, to a mechanically operated valve, it operates by manual or automatic remote control on the hydraulic principle of balanced and unbalanced fluid line pressure. As virtually no external force is required, even a large 24" valve could be opened or closed as easily as a 1½" valve—at the touch of a finger.

Designed for cold fluid service, they are especially suited for handling water, salt water, chemical solutions, oil, gases and air. Due to the fact that they utilize just one non-metallic operating part they are extremely resistant to corrosion and erosion as well as electrolytic action. Their capacity is considerably greater than that of the globe type of valve on the same pressure drop or loss.

Flexflo Remote Control Valve



This valve employs no seats, discs, springs or weights and has no packing gland, stuffing box or exposed members. In its compactness it requires no more head room than a pipe. Moreover it eliminates overhead chains, extensions and costly motorized equipment. Several valves can be controlled from a central remote control station. It can be operated hydraulically or pneumatically by various systems such as manual, electro-solenoid, mechanical or automatic remote control. Full details in bulletin No. 880 are available by writing Grove Regulator Company, 6483 Green Street, Oakland 8, California.

Ridgid Strap Wrench

This new tool recently added to the Ridgid line is intended for better handling and protection of polished nickel and chrome pipe and tubing. It is made with strong I-beam handle and solid head, all in one piece, with a handy hang-up hole in the end. It is easy to attach and use, is positive in grip. Special webbing strap of great strength is quickly removed for replacement by pushing out pin held by spring clips. This Ridgid Strap Wrench is made in two sizes: No. 2, capacity ⅛" to 2", 17" strap; No. 5, 1" to 5", 30" strap. Manufactured by The Ridge Tool Company, Elyria, Ohio.

Ridgid Strap Wrench

New Hard Hat

The Davis Emergency Equipment Company, Halleck Street, Newark 4, N. J. has perfected a new hard hat offered to industry under the trade name Hedgard. Hedgard is built to give 3 way protection to its wearer. Yet the weight has been kept at a minimum. The top of the crown of Davis Hedgard is reinforced for direct blows. The side of the crown is built to stand glancing blows and the brim is made flexible yet strong so that it will not crack when dropped.

Hedgard Hat

The blow is first absorbed on the crown which has a "give and deflect action." It is further absorbed in the new cradle and sweatband construction which acts as a shock absorber. The Davis Hedgard will stand better than 8 lbs. dropped 10 feet which is twice the standard drop-test.

New Liquefied Gas Installations Drop

Less than 75,000 new home installations of liquefied gas were made during the past year, due to the diversion of tremendous quantities of the gas to war work, it was revealed yesterday when members of the Liquefied Petroleum Gas Association received the annual progress report of the industry. The industry continued, however, to service almost 2,000,000 American families who live away from city gas mains.

The report, made by G. G. Oberfell, prominent Western oil official, indicated that few new domestic installations would be made in the coming year, the major interest of all companies in the industry being centered on supplying vital war materials while attempting to service present customers.

"Rubber and aviation gasoline consumed rapidly increasing quantities of butane and propane, particularly in the last half of the year," he said.

New War Uses

In outlining the war uses, Mr. Oberfell listed the making of synthetic rubber for tires, self-sealing airplane gasoline tanks and other equipment; the use of propane for increasing the volatility of high octane aviation gasoline; the use of mixtures of butane and propane for steel cutting in shipyards and other steel fabricating plants; the increased use by the glass industry in the making of containers to take the place of tinned steel and installations made in defense housing projects erected near war plants.

The task of servicing the almost 2,000,000 American homes using liquefied petroleum gas was a major problem of the industry in 1943, the report stated. Mr. Oberfell added that this problem would increase in 1944, due to manpower shortages, the inability of the industry to get new containers and lack of proper transportation facilities.

"Average gallons of liquefied petroleum gas delivered per employee in 1943 increased 123 per cent over delivery per employee in 1941," he said.

CP Sets Standard for Homes, Architects and Builders Told

Not only will women expect more efficient kitchens in fully equipped postwar homes, but the workmanship and materials of the entire house will be judged by the kitchen equipment, the current CP Gas Range architect and builder campaign points out.

The kitchen will be one of the few places where the prospective purchaser will be able to see trade names and symbols and thus judge quality, according to CP manufacturers.

With the new designs and expected changes in equipment, recognized trade names and performance standards will become of greater importance than ever. The prospective purchaser will have no way of telling what results to expect from new equipment unless it bears a recognized symbol that will create confidence, indicate that the equipment has been pre-tested, and assure economical and satisfactory performance.

"No matter what postwar Gas Ranges look like, if they bear the CP Seal women will know they are tops in economy, speed, convenience and cooking results," CP advertisements say. "The CP Seal is the American woman's buying guide—the Seal that will make homes more livable and more saleable."

Detroit-Michigan Stove Co. Appoints Divisional Sales Mgrs.

John C. Pankow, Director of Sales for Detroit-Michigan Stove Company, has just announced the appointment of Divisional Sales Managers for the Southeastern Division and Northwestern Division.

F. F. Hamilton will supervise sales of Detroit Jewel and Garland domestic gas ranges and Garland commercial cooking equipment in the southeastern states, with headquarters in Atlanta.

Ray M. Houdek will serve in a similar capacity in the northwestern states, operating from Kansas City.

Both men have been associated with the company for several years as sales representatives in these areas.

★ UNFINISHED BUSINESS ★

UNCLE SAM has "unfinished business" all over the world. But he's getting along with it, fast! We, of PAYNEHEAT, are concentrating on our war job. But when the shooting stops, our dealers can resume *their* unfinished business—with time-tested, years-ahead . . .

Payne

ZONE-CONDITIONING

Post-war successor to old-fashioned central heating! Carefree, fuel-saving gas heating and fresh air circulation . . . under finger-tip control *by zones or individual rooms.* You'll hear more about PAYNE Zone-Conditioning. But meanwhile, let's all help finish the *big* job. *Back the boys with Bonds!*

ARMY E NAVY

GAS FUEL (HAS) EVERYTHING

PAYNEHEAT

NEARLY 30 YEARS OF LEADERSHIP

Payne FURNACE & SUPPLY CO., INC., BEVERLY HILLS, CALIFORNIA

SURE, that Saturday night pay envelope's bulging. But let me tell you something, brother, before you spend a dime . . . *That money's mine too!*

I can take it. The mess out here. And missing my wife and kid.

What I *can't* take is you making it tougher for me. Or my widow, if that's how it goes. And brother, it *will* make it tough—if you splurge one dime tonight. You're making money. More money than there's stuff to buy. Money that can sock the cost of living to kingdom come—if you blow it! So hang on, till the job's done. On to every last dime—till the squeal means a hole in the seat of your pants!

You're working . . . and *I'm fighting* . . . for the same thing. But *you* could lose it for both of us—without thinking. A guy like you could start bidding me right out of the picture tonight. And my wife and kid. There not being as much as everybody'd like to buy—and you having the green stuff. But remember this, brother—everything you buy helps to send prices kiting. Up. UP. AND UP. Till that fat pay envelope can't buy you a square meal.

Stop spending. For yourself. *Your* kids. And mine. That, brother, is sense. Not sacrifice.

Know what I'd do with that dough . . . if I'd the luck to have it?

I'd buy War Bonds—and, God, would *I* hang on to them! (Bonds buy guns—and give you four bucks for your three!) . . . I'd pay back that insurance loan from when Mollie had the baby . . . I'd pony up for taxes cheerfully (knowing they're the cheapest way to pay for this war) . . . I'd sock some in the savings bank, while I could . . . I'd lift a load off my mind with more life insurance.

And I wouldn't buy a shoelace till I'd looked myself square in the eye and knew I couldn't do without. (You get to knowin'—out here—what you can do without.)

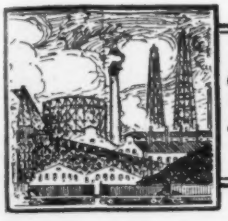
I wouldn't try to profit from this war—and I wouldn't ask more for anything I had to sell—seeing we're all in this together.

I've got your future in my rifle hand, brother. But you've got both of ours, in the inside of that stuffed-up envelope. You and all the other guys that are lookin' at the Main Street shops tonight.

Squeeze that money, brother. It's got blood on it!

Use it up . . . wear it out, make it do...or do without

A United States war message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by the Magazine Publishers of America



News of the Gas Industry

The New England Gas Association 18th Annual Business Conference

This is a one-day Conference to be held March 23rd at Hotel Statler, Boston.

Because of war requirements, the Program Committee decided on a one-day conference this year instead of the customary two-day conference. The papers of rather direct interest to the members of our several Divisions which were customarily presented at the Thursday afternoon and Friday morning sessions have been omitted this year. The appliance and equipment exhibit, the home service luncheon, and the special function that was often held on Thursday evening have also been omitted.

However, within the limit of this year's two business sessions, the Program Committee has provided what it feels to be a strong program of direct interest to company executives, including department heads and their principal associates. Much information presented by this program will be of even more pressing interest than that presented at many of our annual meetings.

Following the election of Officers and Directors, the Year's Report will be presented by Clark Belden, Executive Secretary of the Association.

Post-War Developments of the Gas Industry and the Appliance and Equipment Branches will be covered in an address by Colonel Willard F. Rockwell, President, Association of Gas Appliance & Equipment Manufacturers and President, Pittsburgh Equitable Meter Company.

He will discuss the necessity for several post-war plans to cover various contingencies; Effect of continued Government control after the war; Prospects for increased manufacture, and natural gas distribution and consumption.

The address of N. B. Bertolette, President, The New England Gas Association and President, The Hartford Gas Company, will cover the following topics: War cooperation, home service, control of operating costs, depreciation, rates, post-war planning and sales promotion.

National Developments in the Gas Industry will be discussed by Ernest R. Acker, President, American Gas Association and President and General Manager, Central Hudson Gas & Electric Corporation.

The balance of the program follows:

Mobilization For Post-War Action; by A. M. Beebee, Chairman, A.G.A. Post-War Planning Committee and General Superintendent, Gas Department, Rochester Gas & Electric Corporation.

America's New Frontier; by Walter R. MacCornack, Dean, Department of Architecture, Massachusetts Institute of Technology, Vice-President, The American Institute of Architects.

Gas Industry Research; by Everett J. Boothby, Chairman, A.G.A. Committee on Domestic Gas Research, Vice-President and General Manager, Washington Gas Light Company.

A Few Facts About The Institute's Program; John I. Yellott, Director, Institute of Gas Technology.

The Importance Of The Gas House Heating Load; Henry O. Loebell, Chairman, A.G.A. Subcommittee on Economics of House Heating, Consultant, Surface Combustion Division, General Properties Co., Inc.

Industrial Gas Outlook; Frederic O. Hess, President, The Selas Company, Philadelphia.

We'll Always Need Gas; C. George Segeler, Engineer of Utilization, American Gas Association.

Natural Gas Conference

A Natural Gas Spring Conference will be sponsored by the Natural Gas Department, American Gas Association on May 11, 12 and 13, 1944 at French Lick Springs Hotel, French Lick, Indiana.

The program has not yet been completed but it is expected that it will include a symposium on the storage of natural gas and one on long distance transmission of natural gas. All phases of these studies will be considered and speakers will be selected from sections of the country in which such problems are of particular interest.

Industrial and Commercial Gas Conference

The 1944 American Gas Association War Conference on Industrial and Commercial Gas will be held at Hotel Seneca, Rochester, New York, Thursday and Friday, March 30 and 31.

Headliners will include Clarence Birdseye, who will speak on foods, General Horman F. Safford of the Ordnance Department, who will speak on the current production of war materials; Dr. C. K. Mees, Vice President in Charge of Research, Eastman Kodak Company; Herman Russell, President, Rochester Gas and Electric Corporation, who will speak on war-time problems of management.

The Conference comes at a time when factories, mills and shops are using more industrial gas than at any previous time; when the greatest number of factory and mill workers are handling industrial gas equipment and are producing more and more output with industrial gas; and, also, when more people, military and civilian, are eating more meals away from their homes than at any other time. These conditions have created the greatest impact of the war on the gas load but, at the same time, have created the opportunity to learn new things and to develop opportunities from them. These will be explored thoroughly at the Conference.

The all-important reconversion period will receive full attention, as will post-war competitive and technical subjects.

CONVENTION CALENDAR

March

15-16 *West Coast Technical Conference on Domestic Gas Research.* Ambassador Hotel, Los Angeles, Calif.

22-23 *Southern Gas Association* Annual Meeting, Roosevelt Hotel, New Orleans, La.

23 *New England Gas Association,* Annual Meeting, Boston, Hotel Statler.

30-31 *1944 American Gas Association War Conference on Industrial and Commercial Gas.* Hotel Seneca, Rochester, N. Y,

April

18-19 *American Gas Association Distribution Conference.* Hotel Statler, Cleveland, Ohio.

19-20 *Missouri Assn. of Public Utilities.* Annual Business Meeting, St. Louis, Jefferson Hotel.

May

2 *Pennsylvania Gas Association* Annual Meeting. Philadelphia, Pa.

11-13 *American Gas Association, Natural Gas Dept.* French Lick Springs Hotel, French Lick, Indiana.

15-16 *Indiana Gas Association Annual Convention.* Hotel Lincoln, Indianapolis.

June

5-7 *Advertising Federation of America,* Annual Meeting Hotel Sherman, Chicago.

6-7 *American Gas Association Joint Production and Chemical Committee Conference.* Hotel Pennsylvania, New York, N. Y.

6-8 *Public Utilities Advertising Association,* Annual Meeting Palmer House, Chicago.

6-8 *Southwestern Gas Measurement Short Course,* University of Oklahoma, Norman, Okla.

Peacetime Jobs Theme of CP Gas Range Display Contest

Furniture, department stores and gas range dealers will compete for War Bonds as prizes in a contest designed to publicize the most effective window display built around the poster in the CP Gas Range Business Building Plan. First prize in the contest is a $50 War Bond, second prize a $25 War Bond, and five honorable mentions.

The 25 x 38 inch 2-color CP poster around which displays will be designed, carries out the theme of the current CP gas range campaign, "You Can Help Give Service Men Peacetime Jobs by Planning Now to Buy Your CP Gas Range with Extra War Bonds." Photograph of displays entered in the contest must be mailed on or before June 15.

Object of the CP Business Building Plan is to have retailers obtain orders for CP Gas Ranges now for delivery after the war and thus create a backlog of orders that will start the wheels of peacetime industry turning and make jobs for service men.

Full details on the CP Display Contest and for a complete kit containing a copy of the poster and other dealer helps can be obtained from CP Gas Range Division, Association of Gas Appliance and Equipment Manufacturers, 60 East 42nd Street, New York 17, New York.

Gas and Electric Engineers Confer

Officers and committee chairmen of the Technical Divisions of the Gas and Electric Sections of the Wisconsin Utilities Assn. have begun conferences to dig out subjects for another general session of the Association.

E. C. Hemes, chairman of the Gas Technical Division, presided at a meeting of the Division chairmen in the Association's office recently.

Advisors and chairmen of Gas Division committees suggested subjects that will be given further consideration for inclusion in a program. Among subjects for such consideration by the Manufacture Committee, S. W. Davison, chairman, are: Gas Oil Situation, Production Economies, Paints and Other Productive Materials, Experiences with New Uses of Butane and Propane, Carborundum linings in water gas machines.

Distribution Committee, D. W. True, chairman—Winter Fogging, Gum Deposits in Mains and Services, Application of Safety Rules.

Meter and Presure Regulator Committee, A. W. Kwapil, chairman—Availability of Materials, New Test Periods, Progress in Standardization, Diaphragms.

Customer Service Committee, P. A. Hoffman, chairman—Service Cost Experiences, Experiences with Estimated Bills in Customer Relations.

Committee chairmen will consult with advisors and committee members before making final decisions in the selection of subjects and speakers.

Manual of Gas Utilities Job Classifications

The Southern Personnel Conference group of the American Gas Association has published a manual of Gas Utilities Job Classifications, according to an announcement by Chairman C. Horne, Alabama Gas Company, Birmingham, Alabama. Prepared by a Committee on Job Classifications under the chairmanship of W. B. Collins, vice president, Peoples Water & Gas Company, Miami Beach, Florida, it represents a study of gas utility operations in the southern region of the United States.

The manual covers the functions, responsibilities, minimum training and experience required for replacements under wartime emergency conditions and the physical requirements for 84 job classifications found in all departments of gas utilities' operations. It is for use in connection with Manning Tables, Replacement Schedules, Selective Service requirements and similar uses.

The books are bound and are available from the American Gas Association, 420 Lexington Avenue, New York, N. Y., at a cost of $1.00 per copy. A similar manual covering Natural Gas Distribution Job Classification, prepared by the Southwest Personnel Conference group, is also available at the same price.

Niagara Hudson System Petition

The Niagara Hudson System companies whose petition for approval to consolidate was denied by the Public Service Commission on January 24, filed a petition at Albany on February 21st, for a rehearing, based on the contention that the Commission's decision erred in matters of fact and law. The original petition was amended to the extent that a reduction of $14,497,768 in the capital stock of The Niagara Falls Power Company is provided for. This reduction, recently approved by the PSC, was made necessary by a write down of this amount previously ordered by the Federal Power Commission.

The petition denies that there are write ups in the accounts of any of the System's operating companies and asserts that the statutes under which the consolidation is sought do not require the Commission to pass upon property values as an element in granting or denying consolidation.

Underwriters' Laboratories

A booklet reviewing the fifty years of service rendered industry by the Laboratories which are sponsored by the National Board of Fire Underwriters 207, East Ohio Street, Chicago 11, gives an historical sketch of their early activities and growth.

Some of the work done has been in connection with the propagation of flame in gas-air mixtures and the safeguarding of gas fuel consuming and control equipment.

Copy of the booklet will be mailed on request.

F.P.C. Report on the Natural Gas Act

The Federal Power Commisison has issued its report entitled "The First Five Years Under the Natural Gas Act," which was prepared at the request of the Honorable Clarence F. Lea, Chairman of the House Committee on Interstate and Foreign Commerce, who was the original sponsor of the statute in the House of Representatives.

This report contains not only an account of the Commission's activities since passage of the Act in 1938, but also a record of the precedents which have been established in regulatory law and procedure in the administration of the statute.

Copies of the report will be furnished upon writing the Federal Power Commission, Washington, D.C.

Interstate Oil Compact Commission

On account of congested hotel conditions, dates for the New Orleans Quarterly Meeting of the Interstate Oil Compact Commission have been changed to Monday and Tuesday, April 3 and 4.

Arrangements have been made with the Roosevelt, Monteleone, New Orleans, St. Charles and Jung Hotels to provide rooms for the meeting. Headquarters will be at the Roosevelt where the Committee meetings and general sessions will be held.

Indiana Gas Association

The 1944 Convention of the Indiana Gas Association will be held at the Hotel Lincoln, Indianapolis, on May 15th and 16th.

The Board of Directors will meet on the 14th.

The program committee is Tom Kemp, Indianapolis, chairman; C. V. Sorensen, Hammond; and Ed Hahn, Kokomo.

Gas Speeds Building of Mightiest Warship

Nine months ahead of schedule—an achievement which gas helped make possible—the world's mightiest battleship, the 45,000-ton U.S.S. Missouri, was launched at Brooklyn Navy Yard.

More than 100,000,000 cubic feet of gas went into the construction of the dreadnought.

It supplied the heat for shaping the 90 miles of piping which went into the vessel, for forging thousands of fittings, for brazing, casting and stress-relieving.

Navy officers have pointed out that by getting ready for action ahead of schedule the Missouri may be expected to help in shortening the war and reducing casualties. To the extent that gas speeded its construction, Brooklyn Union and its employees contributed toward these important ends.

Peoples Gas Booklet Is Now Available

A new booklet has been made available for use by any gas company, according to word recently received from advertising manager Clayton G. Cassidy of the Peoples Gas Light and Coke Company, Chicago, Illinois.

Four by 7 inches in size, it includes a great deal of valuable information which will help a housewife make minor adjustments when necessary and use her gas range effectively during war-time.

Compact, well-prepared and easily understandable, it contains 22 pages your customers will be interested in reading and has numerous illustrations.

The booklet can be secured from the Republic Printing Company, 732 Federal Street, Chicago at a cost of $57.50 per 1000 up to 5000 copies and at $52.50 per 1000 in larger quantities.

Imprint of your gas company will appear on outside and inside front cover when furnished in quantity.

It has been generalized to fit any situation. A sample copy may be secured by writing direct to the Republic Printing Company.

Greenleaf Appointed Director New York Region of W.P.B.

Appointment of Lewis S. Greenleaf, Jr., of New York, as Director of the New York Region of the War Production Board, was announced recently by Donald M. Nelson.

Mr. Greenleaf, who has been Acting Regional Director since last November, came to the War Production Board, Washington, in March, 1942, as Chief of the Special Industrial Machinery Branch of the Office of Industry Operations. On October 1, 1942, he became Assitant Deputy Director General for Industry Operations under Ernest Kanzler. In December, 1942, he became Director of the Consumers Durable Goods Division, which post he held until his appointment as Acting New York Regional Director last November.

In private business Mr. Greenleaf was Assistant Secretary and Director of the Behr-Manning Corporation, Troy, N. Y., and Director of the Norton Company, Worcester, Mass.

W. O. Wilson Appointed Worthington Commercial Vice President

Appointment of William O. Wilson of Evanston, Illinois, as a Commercial Vice-President of Worthington Pump and Machinery Corporation, has been announced at the corporation's General Offices at Harrison, New Jersey.

In his new capacity, Mr. Wilson will be responsible for general supervision and direction of all of Worthington's commercial activities in the Chicago, St. Louis, Kansas City, and St. Paul District Office territories, with his headquarters at the Chicago District Office, 400 West Madison Street, Chicago.

W. O. Wilson

Mr. Wilson has been with Worthington Pump and Machinery Corporation and its predecessor companies since 1898, except for a two-year period starting in 1911, when he was employed as Construction Engineer for American Water Works and Guarantee Company. In 1919, Mr. Wilson was appointed District Manager at Pittsburgh, and in 1928 was transferred to Chicago as District Manager. Since 1937 he has been Manager of Worthington's Midwest District comprising the Chicago, St. Louis, Kansas City, and St. Paul District Office territories.

Launching of Liberty Ship Allan C. Balch

The Liberty ship *S. S. Allan C. Balch,* named after the late Allan C. Balch, a founder of the Southern California Gas Co., was launched at the California Shipbuilding Corporation's ways at Terminal Island, Los Angeles Harbor, on January 17. Many high-ranking executives of west coast gas and power utilities, contemporaries of Mr. Balch during his many years as a leader of the gas industry, were present at the launching.

Mrs. Alexander Macbeth of South Pasadena, Calif., wife of Alexander Macbeth, former president of the Southern California Gas Co. and a member of the board of directors of California Institute of Technology, christened the ship. Mrs. James R. Page of Los Angeles was matron of honor.

Mr. Balch passed away in 1943. He was an engineer who contributed much to the present high development of natural gas, light and power in California. Born at Valley Falls, N. Y. in 1864, he was graduated in 1889 from Cornell University. He began his engineering career at Seattle, Wash., and later worked in the light and power field at Portland, Ore.

Mr. Balch moved to Los Angeles in 1896 and subsequently became a founder of the Southern California Gas Co. at Los Angeles and the San Joaquin Light & Power Co.

As an official of the California Insttiute of Technology at Pasadena, Calif., Mr. Balch played an important role in creating the Kerckhoff Biological Laboratories; and in 1929-30 he and Mrs. Balch founded the Balch Graduate School of Geological Sciences at the Institute.

The name of Allan C. Balch was suggested to the U. S. Mariitme Commission for the naming of a Liberty ship by Dr. Robert A. Millikan, head of California Institute of Technology.

The ship was the 317th launched by the California Shipbuilding Corp.

War Model Gas Range. A folder issued by Geo. D. Roper Corporation, Rockford, Ill., gives details of design and the special features of this new model No. 4-200 V. now in production in limited quantities dependant on quarterly allocation of materials.

CLEVELAND

"A" TYPE METERS
"B" TYPE METERS
DIAPHRAGMS

Cleveland Gas Meter Co.
ESTABLISHED 1895
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GAS PLANT EQUIPMENT
UGI REFINERY GAS REFORMING PROCESS
UGI NATURAL GAS REFORMING PROCESS
UGI HEAVY OIL PROCESS
GAS DISTRIBUTION
PIPE LINE CONSTRUCTION
THE U.G.I. CONTRACTING COMPANY
A DIVISION OF
UNITED ENGINEERS & CONSTRUCTORS INC
NEW YORK PHILADELPHIA CHICAGO
MAXIMUM RETURN TO CLIENT PER DOLLAR EXPENDED

These utility engineers attended a special school at Servel, Inc., Evansville, Indiana from February 14 to 16 to study the All-Year Gas Air Conditioner which Servel will distribute through gas companies after the war. This was one of a series of such schools now being held at the factory for gas utility sales, application, installation, and service engineers to prepare them to meet the demands of the post war market.

Servel Training School on Gas Air Conditioning

Moving into the third phase of the post war action program on the All-Year Gas Air Conditioner, Servel, Inc., during February has held a training school at the factory for application, service and sales engineering representatives of gas utility companies from all over the country. The more than 50 engineers who were at the Servel plant in Evansville, Ind., came from such widely divided sections as Omaha, Nebraska; Boston, Massachusetts; Dallas, Texas, and Miami Beach, Florida.

"The purpose of this series of meetings," John K. Knighton, sales manager of Servel's Gas Air Conditioning Division said, "is to thoroughly acquaint members of the gas industry with the problems of application, installation, and servicing of the new unit. On February 21 another week-long school will be held for a much larger group to cover the sales question."

The first phase of Servel's air conditioning program for the post war era started last June when Mr. Knighton, Louis Ruthenburg, president of Servel, Inc., Geo. S. Jones, Jr., vice-president in charge of sales, and other Servel executives held a series of six meetings from coast to coast to introduce the company's plans for the post war future of gas air conditioning. These meetings were held in New York, Atlanta, Chicago, Kansas City, Los Angeles, and San Francisco. They were attended by executives of the nation's gas utility companies. At the time the company's post war plans in the field of air conditioning received the national commendation of the Committee for Economic Development . . . a group of American businessmen who are working for heightened post war employment.

The second phase of the post war action plan was a series of meetings which were started last fall and are still continuing. These regional meetings which have been held in 33 different cities have been attended by 1378 gas company executives. During April, eight more of these meetings will be held on the West Coast.

"By the time we complete our regional meetings," Mr. Knighton said, "we will have discussed the prospects of the Servel All-Year Gas Air Conditioner with more than 1500 people representing almost every important gas company in the country.

"And now we are coming into our third training phase which will prepare men to form skeleton sales and service staffs throughout the nation. When wartime restrictions of manufacturing have been lifted the Servel Gas Air Conditioner will be ready for market."

On February 14 through February 16 a short school was held at the factory for more than 50 service engineering representatives to consider the service problems of the post war era of the Servel All-Year Gas Air Conditioner.

This school is the second of the series and will be followed by a third which opens February 21 to consider sales problems. The fourth and last school will be another service group which will meet February 28 through March 4. Upon completion of this school the gas utility company representatives will have been trained in the application, sales and service of the new Servel unit so that they in turn may set up skeleton programs in their own company for post war operations.

90 Years of Gas Service

On February 11th, Portsmouth Gas Company, Portsmouth, Va., completed 90 years of continuous uninterrupted service to its customers. Generous newspaper advertising carried the message of service to the local public.

From a few score original customers, the number of gas consumers in Portsmouth had increased to 450 by 1902, and gas consumption in that year reached 18 million cubic feet. This amount of gas is now manufactured and sold each ten days of the year, and gas consumers now served by the company number more than 13,000.

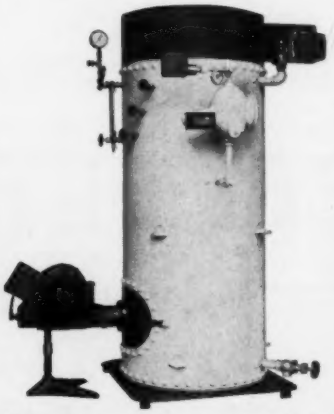
The company now operates under the able direction of B. B. Ferguson, President.

Cleveland Gas Meter Co. in New Quarters

Founded over 49 years ago by William H. Knight, The Cleveland Gas Meter Company, heretofore located at 2055 East 65th Street, Cleveland, has moved office and factory to new quarters at 2009 Rockwell Avenue in that city. They are manufacturers of A and B type domestic gas meters, furnishing also meter diaphragms and a meter repair service.

Pipe Coatings. In bulletin No. 29 issued by Wailes Dove-Hermiston Corporation, Westfield, N. J., attention is given to cleaning and recoating old pipe. The cleaning and coating of the interior of a gas holder is also briefly described and illustrated.

LATTNER
GAS — OIL BOILER
3 HP to 35 HP.



Burns natural gas or regular furnace oils with equal efficiency using same burner.

P. M. Lattner Mfg. Company
Cedar Rapids, Iowa

The McCarty Company 25th Anniversary

Estimated to be the oldest and largest industrial advertising agency west of Chicago, The McCarty Company celebrated in February, its Silver Anniversary. Founded in 1919 by T. T. McCarty, the agency after 25 years is still serving many of its original clients.

Headed by McCarty as president, with headquarters in Los Angeles and operating branches in San Francisco and Pittsburgh, the concern is far removed from its meager beginnings in the year immediately following the end of World War I. Its growth has been consistent and steady, and recognition has been accorded not only by all media groups but by advertisers and contemporary agencies as well.

At its inception the entire personnel consisted of McCarty and one stenographer. In its present location in the Bendix Building the agency now occupies space in excess of 10,000 square feet, and handles more than fifty of the Pacific Coast's largest industrial advertisers. In addition, it is serving out of its eastern offices many well known middle-west and southwestern organizations.

Long a champion of trade journals, The McCarty Company campaigns have used this medium as the backbone of numerous industrial schedules. During its years of agency service, The McCarty Company has built up one of the outstanding source libraries dealing with the leading industries of the country.

Houdek Rejoins Detroit Michigan Stove Co.

Ray M. Houdek, who is well-known throughout The Gas Service properties, has returned as representative of the Detroit Michigan Stove Company and has been named district manager of that organization for ten states.

Mr. Houdek for many years represented the Detroit Michigan Stove Company in the Kansas City territory.

He began his new duties with the Detroit Michigan Stove Company on February 1. His territory includes the following states where he will act as sales manager: North Dakota, South Dakota, Nebraska, Minnesota, Iowa, Colorado, Utah, Wyoming, Missouri and Kansas.

Ruthenburg Surveys Means for Post-War Prosperity

In a speech that surveyed ways and means of achieving post-war prosperity through reduced costs, low prices, and high values Louis Ruthenburg, president of Servel, Inc., Evansville, Indiana, laid out a definite six point program which he recommended be followed by industry.

The speech was made before the Economic and Business Foundation Forum at the Hotel Pick-Ohio on February 17.

"American business management generally recognizes the need for establishing high levels of productivity and employment in the post-war period," Mr. Ruthenburg said.

In enlarging on his subject the industrialist pointed out that these objectives could best be obtained by improved product design which would make use of wartime development in materials; increased real wages through productivity which can be obtained by mechanization; sustained production; production incentives for labor; better supervision; and increased worker education.

The forum which was held by the Economic and Business Foundation is the second in a series of five which will be held during 1944 to discuss problems of economics and business management.

Twelfth and Thirteenth Production Awards Granted to Worthington Plants

Second and third star renewals of the Army-Navy "E" and Navy "E" production awards to two plants of Worthington Pump and Machinery Corporation have been announced by Admiral C. C. Bloch, USN, Chairman of the Navy Board for Production Awards. The two "E" Awards constitute the 12th and 13th honors accorded the men and women and management of Worthington.

Worthington's Harrison, New Jersey, Works, producing a multitude of pumps of all types and main and auxiliary condensers and ejectors for Navy fighting ships, won its fifth citation for "production excellence." Besides four consecutive Navy "E" Pennants, the Harrison plant has been presented with the United States Maritime Commisison's "M" Award Pennant and Victory Fleet Flag.

Producing steam turbines and turbo-generator units for the Navy's fighting ships, Worthington's Moore Steam Turbine Division at Wellsville, New York, has won a second renewal star, its third consecutive Army-Navy "E" Award.

Worthington turbo-generator units are virtually the heart of the ship. From them pulsates the electrical energy which controls the ship, fires the guns, cooks the crew's food and makes possible operation of Radar and other detection devices.

Dolph Jansen Jr.

Dolph Jansen, Jr., Assistant Sales Promotion Manager of Servel, Inc., Evansville, Indiana, has recently resigned to become associated with the Zenith Radio Corporation as Assistant Sales Manager of their newly formed radionic hearing aid division.

Mr. Jansen came with Servel in 1935 as Assistant to the Sales Promotion Manager in their New York office, and in 1937 was transferred to Evansville, Indiana as Assistant Sales Promotion Manager.

Chrysler Airtemp Appointments

J. J. Donovan has been named Regional Manager of the Chrysler Airtemp New York office, according to a recent announcement by Paul B. Zimmerman, vice president and general sales manager. Mr. Donovan will direct Airtemp sales and service activities in the greater New York area and New England.

Since 1941 Mr. Donovan had been associated with the War Production Board, Washington, D. C., as Assistant Director of the Automotive Division.

Cliff S. White has been appointed District Representative for Airtemp Division, Chrysler Corp., according to a recent announcement by Edmund A. Orrell, northern sales supervisor. Following preliminary training in Dayton, Mr. White will take up an assignment in the Cincinnati territory.

Mr. White's experience in the refrigeration industry was gained through an association with C. V. Hill & Co., commercial refrigerator manufacturer, over an 11-year period. In this connection Mr. White started as a field man, later spent considerable time in the factory, and then returned to the field as a special representative.

NATURAL GAS LIQUEFACTION PLANTS
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WATER, COAL and OIL GAS PLANTS
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HIGH B.T.U. SUBSTITUTE for NATURAL GAS
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Gas Pressure REGULATORS
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Certified by A. G. A. Testing Laboratory. Write for Catalog and prices on Barber Conversion Burners, Appliance Burners, and Regulators.

THE BARBER GAS BURNER CO.
3702-4 Superior Avenue
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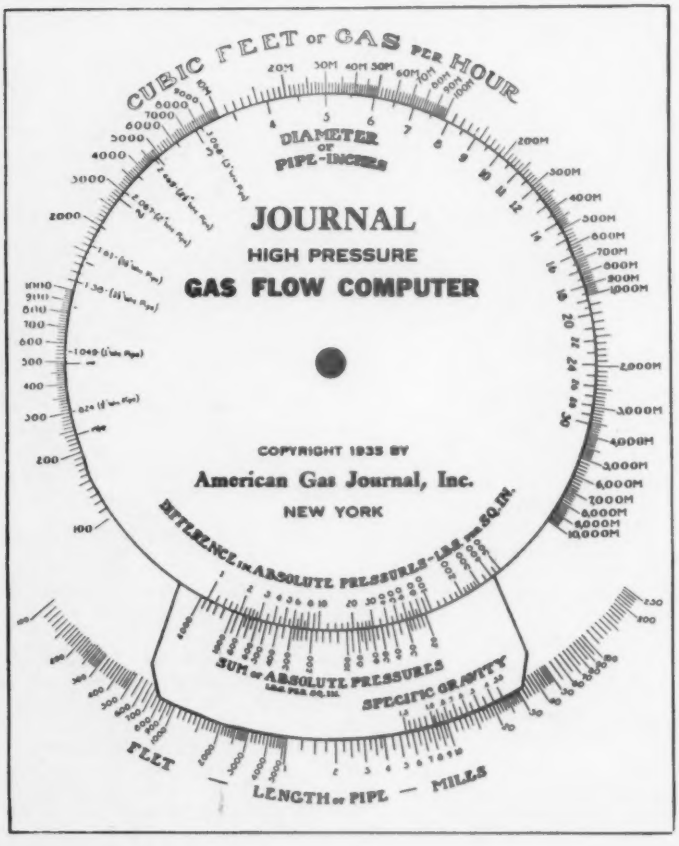
Sizes 1/4" up

"Journal" Gas Flow Computers



New Improved Gas Flow Computers now available of durable celluloid, encased in a convenient leatherette cover with complete instructions.

Actual Size 6¼ x 7½

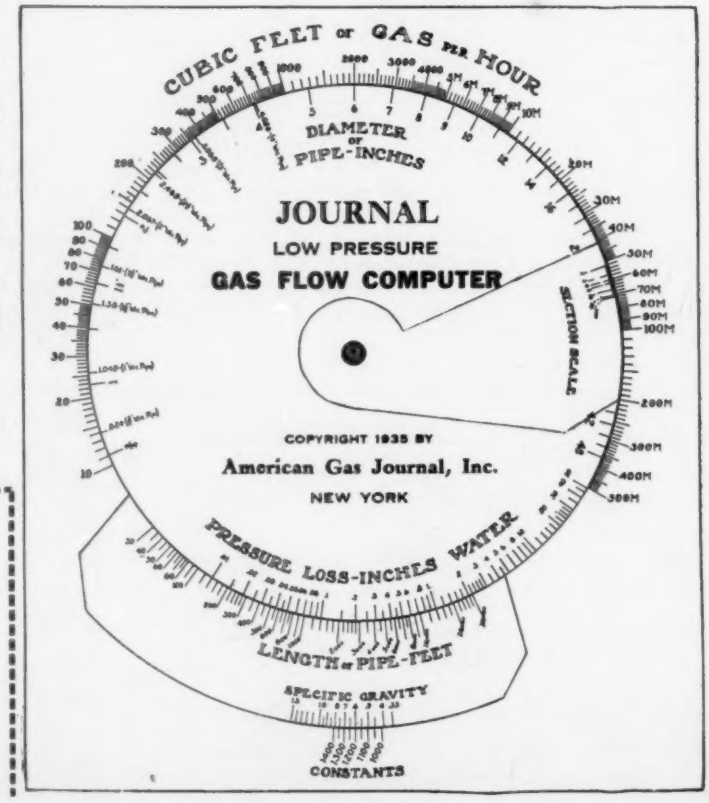
High Pressure Computer Range:

Cu. Ft. of Gas Per Hour—100-10,000 M
Diameter of Pipe Inches ¾-30
Difference in Absolute Pressure—Lbs. per sq. in. 1-500
Sum of Absolute Pressures—Lbs. per sq. in. 2000-20
Specific Gravity 1.5-.35
Length of Pipe—Feet 100-5000
Length of Pipe—Miles 1-250

Low Pressure Computer Range:

Cu. Ft. of Gas Per Hour—10 to 500 M
Pipe Diameter ¾" to 48" (including standard and actual weight up to 4")
Pressure Loss Inches .01-10.
Length of Pipe—Feet 30-30,000
Specific Gravity 1.5-.35
Constants 1400-1000

Price $3.50 Each, Postage Prepaid



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Please enter our order for Computers as follows at $3.50 each, postage prepaid

....HIGH Pressure Computer

....LOW Pressure Computer

NAME .....

ADDRESS .....

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TOPS for
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THE CLEVELAND TRENCHER COMPANY
"Pioneer of the Small Trencher"
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We are working on War Equipment and Supplying Essential and Emergency Requirements for the Gas Industry.

GAS HOLDERS GAS HOLDER REPAIRS PURIFIERS
COMPLETE GAS HOLDER INSPECTION SERVICE
40 Years of Sound
STEEL PLATE CONSTRUCTION

A. G. A. Natural and Mfd. Gas Departments

(Continued from page 39)

parts of a transmission system and are intended to indicate need for additional information in the further development of the art.

An Accounting Committee was set up because certain operations in the natural gas business are peculiar to it. Depletion and underground storage are examples.

In organizing a Committee on Large Volume Sales it was recognized that industrial gas sales in very large volumes generally constitute a much larger percentage of a natural gas company's total sales than they do of a manufactured gas company's. It was also felt that they take in classes of business not usually covered specifically in the Industrial and Commercial Gas Section.

The Technical and Research Committee continues the functions of the former "Main Technical and Research Committee." It will initiate and conduct research on production, storage and transmission and provide standards and methods for the qualitative and quantitative determination of gas components and products. It will also build up technical knowledge of the business through the medium of publications, fellowships at technical schools, etc.

The reorganization also involved the transfer of a number of committees. The Wrinkle and Wrinkle Award Committees have been made general committees of the Association as has the Committee on Vocational Education. The Residential Sales Committee becomes a subcommittee in the Residential Gas Section and the Industrial and Commercial Sales Committee is transferred to the Industrial and Commercial Gas Section. The Accident Prevention Subcommittee is now a part of the general Accident Prevention Committee with representation from the Production and Storage, Transmission and Technical & Research Committees.

As in the past the Natural Gas Department will hold a meeting in the Spring of each year and its annual meeting at the same time and place as the annual meeting of the Association. The Supply Men's Fund and the related Fellowships will be continued as formerly, and the Department will maintain its policy of cooperation with state and regional associations and with the Measurement Short Courses at Norman, Okla., and Morgantown, W. Va.

The new organization plan calls for more publicity regarding the advantages of membership and greater participation by the Natural Gas Department in all activities of the five Sections of the Association.

Manufactured Gas Department

The report of Chairman Hawley for the Manufactured Gas Department as approved by the Board called attention to the report of the Special Committee on Organizational Changes which concluded "that few, if any, changes in organizations or functions will be required to bring them into conformity with the proposed Association reorganization plan. In the case of the Technical Section some changes will be necessary."

The report continues:

"With this in mind the officers of the Technical Section at the direction of the Executive Board continued with its regular organization procedure, completed its committees for 1943-44, and approved the activities proposed by the several committee chairmen, subject to possible rearrangement of some of the Sectional committee personnel and the Departmental affiliations of some of the committees.

"From an operational and control point of view, having first received the approval of the Executive Board, it would seem that the first order of business to ensure properly coordinated progress is the appointment of a Managing Committee for the Manufactured Gas Department.

"The members of this committee should be representative men selected from manufactured gas companies, qualified and experienced in various phases of the industry's problems. Care should also be taken to avoid over-representation of individuals or company representatives on the Association's several committees of this Department, although it may be desirable to see that each of the Sections is represented in an appropriate manner."

Closely following the procedure heretofore announced, Chairman Hawley's report announced as part of the set up a vice-president and chairman of the Managing Committee, an Advisory Committee composed of past chairmen and activities of the Gas Production Committee and of the Gas Conditioning Committee. Special attention was called to the substantial interest of the Manufactured Gas Department in the membership and activities of many Sectional Committees including those of Residential Gas, Industrial-Commercial Gas, Technical and Accounting Sections; also in such general committees as Publicity and Advertising, Rates, Post-War Planning, Personnel Practices, Accident Prevention and Research.

Finally it is provided that the Managing Committee may at any time appoint additional committees on manufactured gas problems. All activities are subject to the jurisdiction of the Executive Board.

Gas Kitchen Program

At its meeting of February 16, 1944 the Executive Board of the American Gas Association, approved the Coordinated Gas Kitchen program, recommended by the Post-War Planning Committee.

The Program will be jointly financed by members of the American Gas Association and the Association of Gas Appliance and Equipment Manufacturers.

Mr. C. V. Sorenson, Chairman, Residential Gas Section, will serve as coordinator of the efforts of the manufacturers and utilities in developing the Coordinated Gas Kitchen sponsored by the Association's Post-War Planning Committee. A special committee under the Chairmanship of Mr. John H. Warden, Vice-Chairman of the Residential Gas Section and Sales Manager of the Oklahoma Natural Gas Company of Tulsa, Okla., has charge of the promotional aspects of the program under the guidance of Mr. Sorenson. Members of this Committee include:

Wallace M. Chamberlain, Michigan Consolidated Gas Company, Grand Rapids, Mich.

J. L. Johnson, Providence Gas Company, Providence, R. I.

J. C. Sackman, Northern Indiana Public Service Company, Hammond, Ind.

C. S. Stackpole, Consolidated Gas Electric Light & Power Co. of Baltimore, Baltimore, Md.

Bernard T. Franck, Milwaukee Gas Light Co., Milwaukee, Wisconsin.

Frank M. Houston, Rochester Gas & Electric Corp., Rochester, N. Y.

Leon Ourusoff, Washington Gas Light Company, Washington, D. C.

Miss Jessie McQueen, American Gas Association, New York.

The Committee also will include representatives of the Association of Gas Appliance and Equipment Manufacturers.

Dunbar Elected to Controllers Institute

P. R. Dunbar, comptroller-treasurer of the Seattle Gas Company, Seattle, Wash., has been elected to membership in the Controllers Institute of America. The Institute is a technical and profesisonal organization of controllers devoted to improvement of controllership procedure

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"ACTIVATED"
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May we tell you why so many Gas Companies have used them for years, ... for effective, economical, more satisfactory H_2S removal. No obligation upon your part.

GREATER CAPACITY . . . GREATER ACTIVITY . . . LESS OXIDE REMOVES MORE H_2S!

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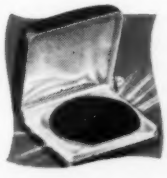
Clean Hot Water the Modern Way!

The modern way is the *Permaglas* way . . . with clean hot water . . . just as clean as the water you drink from the tap...*heated* in glass...*stored* in glass.

That's *Permaglas* . . .



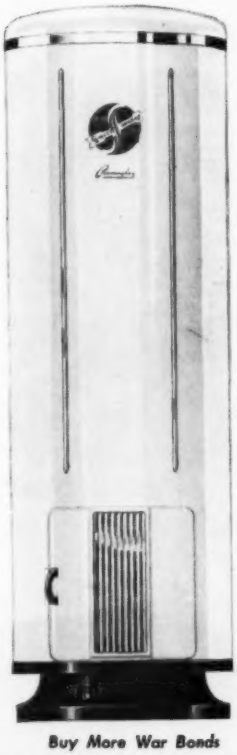
And that is a big feature in your home appliance market, which is demanding new and higher standards of perfection in hot water *cleanliness* and *sanitation.*

SMITHway *Permaglas* Automatic Gas Water Heaters *more* than meet that demand. The tanks are lined with glass—*Permaglas*—a smooth, lustrous sanitary blue glass lining permanently fused to the inside of SMITHway steel tanks.

Today—*Permaglas* is a good name to remember—an excellent product to sell. It's your assurance of quality—your profitable source of customer satisfaction in the automatic water heater field.

"Heated with Gas—Stored in Glass"

Permaglas Victory Model Heaters are available in all sizes in accordance with WPB Limitation Order L-185.



SMITHway *Permaglas* GLASS LINED WATER HEATERS

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